

American Artisan

and Hardware Record

Sheet Metal Work-Warm Air Heating

Vol. 95, No. 2

CHICAGO, JANUARY 14, 1928

\$2.00 Per Year

Again in the Lead!

WATERBURY SEAMLESS
REG. U.S. PAT. OFF.
FURNACE

New 1928 Model



*Many Great Advancements
in Furnace Construction*

- Front panel welded directly to feed and ash chutes
- Heavy welded steel body
- No cement, no rivets, no calking
- No cast iron joints
- Absolutely gas-tight for life of furnace

Easier to Install

- Door frames come all bolted to front
- Only the doors to slip into place

A REAL Humidifier

- Greater Evaporating Surface
- Centered over fire dome
- Evenly distributes humidity
- Automatic at small cost

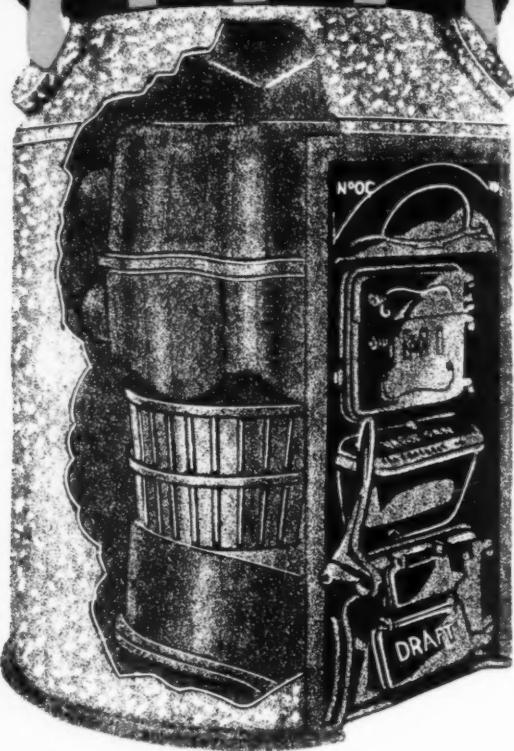
Other Waterbury Features

- Large Combustion Dome
- Full sized radiators
- Certified Standard Code Capacity

NO furnace of lesser quality attracts the profitable trade that only the Waterbury can satisfy. Write for our proposition.

The Waterman-Waterbury Co., 1122 Jackson St., N.E., Minneapolis, Minn.

OAKLAND BALLOON TYPE FURNACE



HIgh above the field stands Oakland—the standard of comparison in warm air furnaces. When you hear the familiar claim: "It's as good as the Oakland in every way", just consider that imitation is the sincerest compliment.

It's easy to sell an Oakland Balloon Type Furnace, and make a friend by doing it. It's easy, perhaps, to sell

cheaper furnaces—but to look the customer in the eye six months later is another thing!

Customers are bound to talk about you. Why not give them a chance to say the good things—the things that send more business to you?

They'll do it if you sell them Oaklands.

Write us for prices, discounts,
and a catalogue of the large
Oakland line.

OAKLAND FOUNDRY CO.

**BELLEVILLE
ILLINOIS**



THIS is the SECOND FIRE

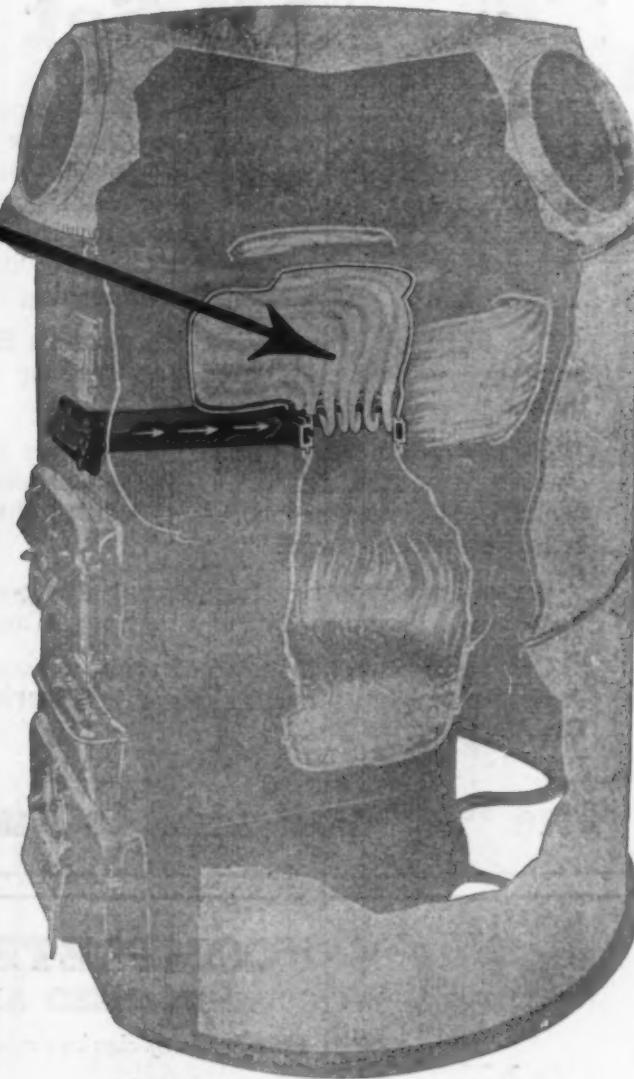
YOU can see the second fire created by the patented Carburetor in the Superior SUPER-SMOKELESS Furnace.

Your customers can see it, too, and that's one reason why it so often sells on sight.

And because this secondary fire uses otherwise wasted smoke, soot and gases for its fuel, it keeps the radiator and flues free from soot. Result, a furnace that is efficient at *all* times.

These facts make fast friends of your customers and sell *more and more* SUPER-SMOKELESS Furnaces for you.

Because the ability of the SUPER-SMOKELESS Furnace to burn smoke, carbon and gases is *actually visible*,



it lends itself to a remarkable *Sales Development Plan* which will make money for you. Write us for interesting details of this sales-making money-making plan.

Utica Division
Richardson & Boynton Company
Successor to Furnace Department

UTICA HEATER COMPANY
UTICA, N. Y.

New York Office: 360 Fifth Ave.
Chicago Office: 3936-45 S. Ashland Ave.

SUPERIOR SUPER-SMOKELESS WARM AIR FURNACE

SUPERIOR DEALERS ARE EXCEPTIONALLY LOYAL—WHY?



All Set for a Big '28?

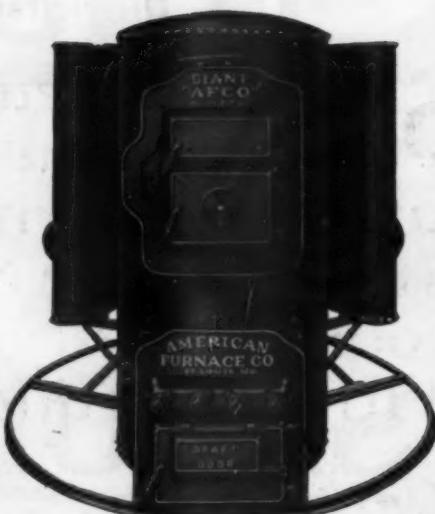
Yes sir, 1928 is going to be a big year for the go-getters and a tough one for the *sit-and-waiters*. You would not be reading this advertisement now if you were not one of the progressive dealers who are always looking for something better.

Get right on this "What Furnace to Sell" question and then you've eliminated one of your toughest problems.

Hundreds of other progressive dealers like you have chosen the "AFCO" line of furnaces because they are built to give the best heating results obtainable—and because they stay sold.

We will give you real friendly sales help along with the best line of furnaces that can be bought anywhere.

Can we send you full information without obligation? A post-card or letter will bring it. **American Furnace Co., St. Louis, Mo.**



**The New
"GIANT" AFCO**

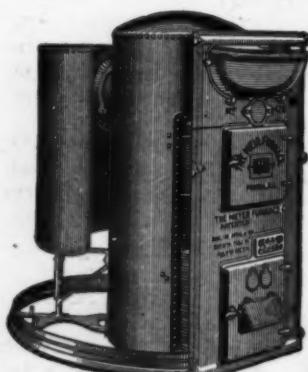
The "AFCO" Line is Built to Sell & Stay Sold!

"COMPLETE SERVICE" CLAIMED AND PROVED

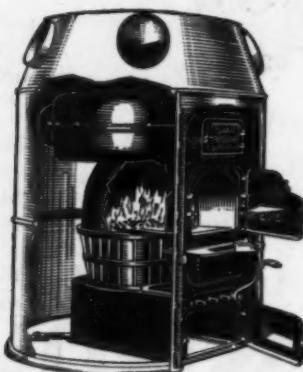
Hundreds of dealers now know this to be a fact

No longer is it necessary for them to look to other sources for any part of their furnace or supply needs.

1928 finds our facilities greatly improved and even better service may be expected by our friends who already know that "Standard Service" is Different and Better.



Weir Steel Furnace



Nesbit Cast Iron Furnace



Stan-Co Steel Furnace

STANDARD FURNACE & SUPPLY COMPANY
Manufacturers and Distributors
OMAHA, NEBRASKA

Agricola

—the better furnace

START the New Year with a new plan and a new furnace. Start building on your quantity sales with better quality.

Agricola is a large volume furnace built on a quality basis.

Here's why
Agricola is produced in large volume in the finest equipped and most modern up-to-date furnace plant in the country and one of the very largest.

Ask us about our high quality and low costs

Write for details today

Agricola Furnace Company
 GADSDEN, ALABAMA

THATCHER PIPELESS FURNACE



Its Economy will win many customers for you

BOTH from the operating and installation standpoints, the Thatcher Pipeless Furnace is the popular choice of the modest home owner due to its economy.

Saving from 30% to 40% on fuel costs is not uncommon because all the heat generated pours directly into the rooms. And the "horse shoe" type radiator assures the maximum amount of heat from the fuel burned because it doubles the fire travel.

The high cast-iron front eliminates the necessity for cutting casings around small openings—a time-saving feature that you will appreciate.

Full trade information and literature on all Thatcher products will be mailed on request.

THE THATCHER COMPANY

Since 1850

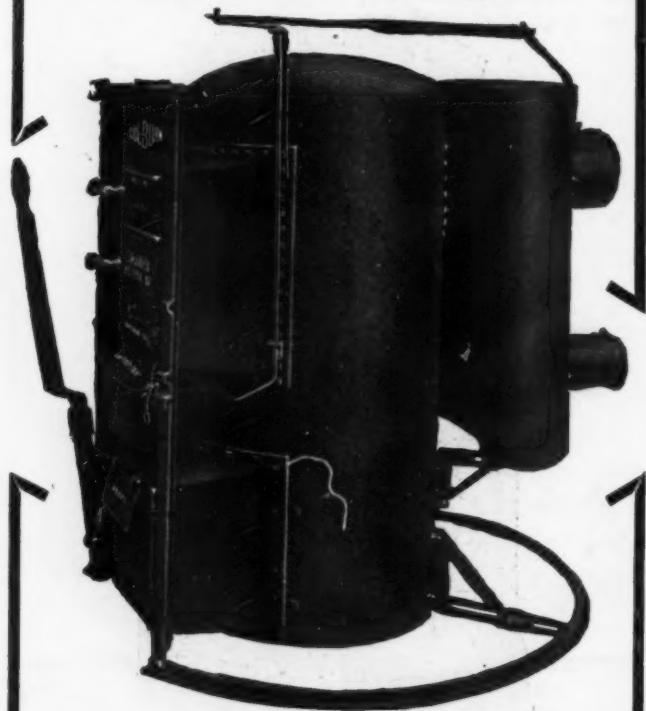
CHICAGO
 341 N. Clark St.

NEWARK, N. J.
 39-41 St. Francis St.

NEW YORK
 21 W. 44th St.

THATCHER
 BOILERS-FURNACES-RANGES

Multiply Your Sales
and Your Profits!



with the **COL-BURN**
you can do it because
the COL-BURN is

BUILT to give the highest type of
heating efficiency
Built to cut coal bill from 20% to 30%
Priced to sell

And because the
COL-BURN Sales Policy
includes:—

A business building advertising plan
A financing plan
Greater profits
Real dealer cooperation

Col-Burn Heater Co.
1955-75 North Long Ave., Chicago, Ill.

Drop the coupon in the mail today

COL-BURN HEATER CO.,
1955-75 North Long Ave., Chicago, Ill.
Send me literature describing the Col-Burn Heaters and
details of your Special Dealer Policy.

Name.....
Address.....

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for STOVES-FURNACES-BOILERS

Send for our illustrated Order Blanks
NORTHWESTERN STOVE REPAIR CO. N CHICAGO-ILLINOIS

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WE MANUFACTURE A COMPLETE LINE OF BOLT PRODUCTS, INCLUDING STOVE BOLTS, CARRIAGE BOLTS, MACHINE BOLTS, LAG BOLTS, NUTS, COTTER PINS, ETC. ALSO STOVE RODS, SMALL RIVETS AND HINGE PINS. CATALOG ON REQUEST.

THE LAMSON & SESSIONS CO.
THE KIRK-LATTY CO.
1971 W. 85th St. Cleveland, O.

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THE CLEVELAND CASTINGS PATTERN COMPANY
CLEVELAND, OHIO

PATTERNS

FOR STOVES AND HEATERS
VEDDER PATTERN WORKS FIRST-CLASS
IN WOOD and IRON
ESTABLISHED 1839 **TROY, N.Y.**

IRON AND WOOD
STOVE PATTERNS
QUINCY PATTERN COMPANY
QUINCY, ILLINOIS

IF there is a tool or machine
that you need and you don't
know where to get it—

Write to the

Notes and Queries Dept.

of

AMERICAN ARTISAN

BOOMER

THIS is our latest addition to the Boomer line. We heartily recommend it for your favorable consideration.

The severe tests we have given this furnace have proven its durability. The unsolicited reports we received from users last winter have been most flattering.

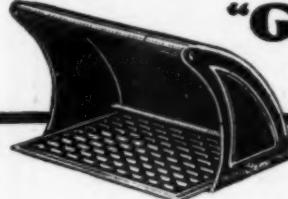
For durability, economy, easy to operate, easy to set up and the low price at which we offer this furnace, you will make no mistake in arranging for the agency.

THE HESS-SNYDER CO.
MASSILLON, OHIO

Makers of BOOMER FURNACES for Forty-Three Years



"GEM" ADJUSTABLE REGISTER SHIELDS



Heat that flies to the ceiling is wasted. Sell "Gem" Register Shields, which direct heat where most needed.

Attractive and easily adjustable. Fit all size registers. Floor Shield retails at \$1.50; Wall Shield at 75c.



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"American Seal" FURNACE CEMENT

Roof Cement — Stove Putty
Plumbers Putty

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WILLIAM CONNORS PAINT MFG. CO.
TROY NEW YORK

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Western Distributor
140 S. Dearborn St., Chicago, Ill.

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Metal Cold Air Faces
Wood Cold Air Faces
Round Furnace Pipe
Single Wall Pipe
Double Wall Pipe
Registers and Fittings
Furnace Regulators
Revolving Chimney Tops
Cast Iron Smoke Pipe
Furnace Cement
Damper Quadrants
Chain and Pulleys
Asbestos Paper
Asbestos Mill Board

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OSBORN CO
CLEVELAND

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Published to Promote
Better
Warm Air Heating
and
Sheet Metal Work

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American Artisan
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ADVERTISING AND EDITORIAL STAFF

Etta Cohn
J. F. Johnson

Franklin Butler
Chas. E. Kennedy

G. J. Duerr
Frank McElwain

Eastern Representatives: M. M. Dwinell, J. S. Lovingham, 156 Fifth Avenue, New York City

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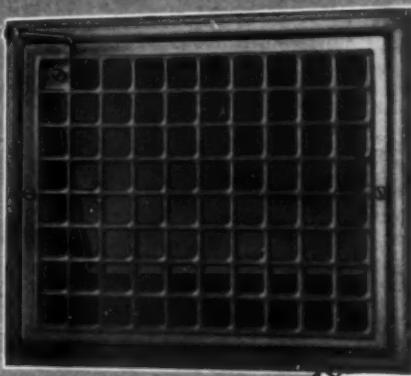
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PROFESSOR A. J. MACK ON FARM VENTILATION

Sheet metal contractors doing business in rural communities are constantly coming into contact with a demand for the construction and installation of ventilating systems particularly adapted to the ventilation of farm buildings. This demand leads to considerable complexity on the part of the sheet metal contractor because of the multi-varied employments of ventilation in this type of work. A cattle housing requires one type of ventilation, while a hay mow may need an aeration system entirely different.

In order to set sheet metal contractors right on this subject of farm ventilation and to give them facts which they can use to advantage, AMERICAN ARTISAN has secured an exclusive series of articles on this subject from Professor A. J. Mack, Department of Mechanical Engineering, Kansas State Agricultural College, Manhattan, Kansas. The fifth of this series appears on page 60 of this issue. Please turn to that page.



No. 345 Set Horizontally

Reversible!

Sizes:-

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- 9 x 12
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THIS NEW SIDEWALL REGISTER MAY BE SET EITHER HORIZONTAL OR VERTICAL, SIMPLY BY REMOVING TWO SCREWS.

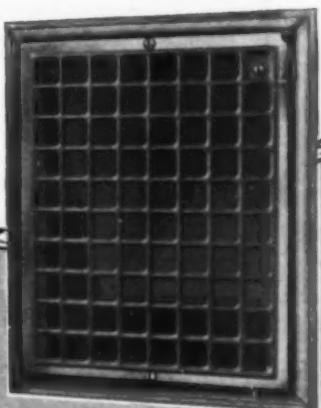


IT IS FURNISHED WITH THE SAME DEEPLY CONVEXED MARGINS AND THE SAME RIGID CORRUGATED FRETWORK THAT HAVE MADE H. & C. Nos. 340 AND 350 PREDOMINANT WHEREVER SIDEWALL REGISTERS ARE USED.



**The Air
Capacity Line**

**The Hart & Cooley Mfg. Co.
New Britain, Conn.
New York - Chicago - Philadelphia**



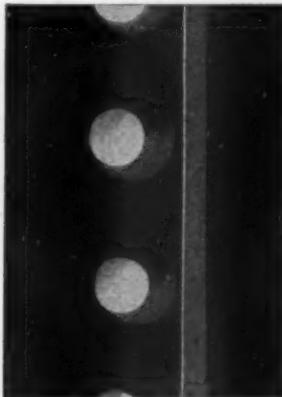
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Why they are popular sellers—



"western" Boiler Plate FURNACES

are just what the public wants, because they meet the every day needs of the average man in a practical rather than theoretical way.



Joints Riveted and Calked

They are:

Permanently gas tight. Built of heavy copper bearing boiler plate, with joints cold riveted and calked, one-piece body construction (without rivets on front extension.)

Economical in operation. Designed on a common sense plan, without useless frills, but including the essentials of economical combustion—hot blast gas consumer, V-baffle in radiator, large brushing surface. The Radiator is extra large with angle support and one-piece side wall construction.

Economical in first cost. Although quality is built into every part of the Western, its price is such that it even competes with a cast furnace.

Practical in design, with features which actually add value in service, such as corrugated top to take up expansion and contraction, and heavy double grates which are easily shaken from a standing position.

Time tested in cold northern climates, and absolutely guaranteed.

WESTERN STEEL PRODUCTS CO.

130 Commonwealth Ave. Duluth, Minnesota, U. S. A.

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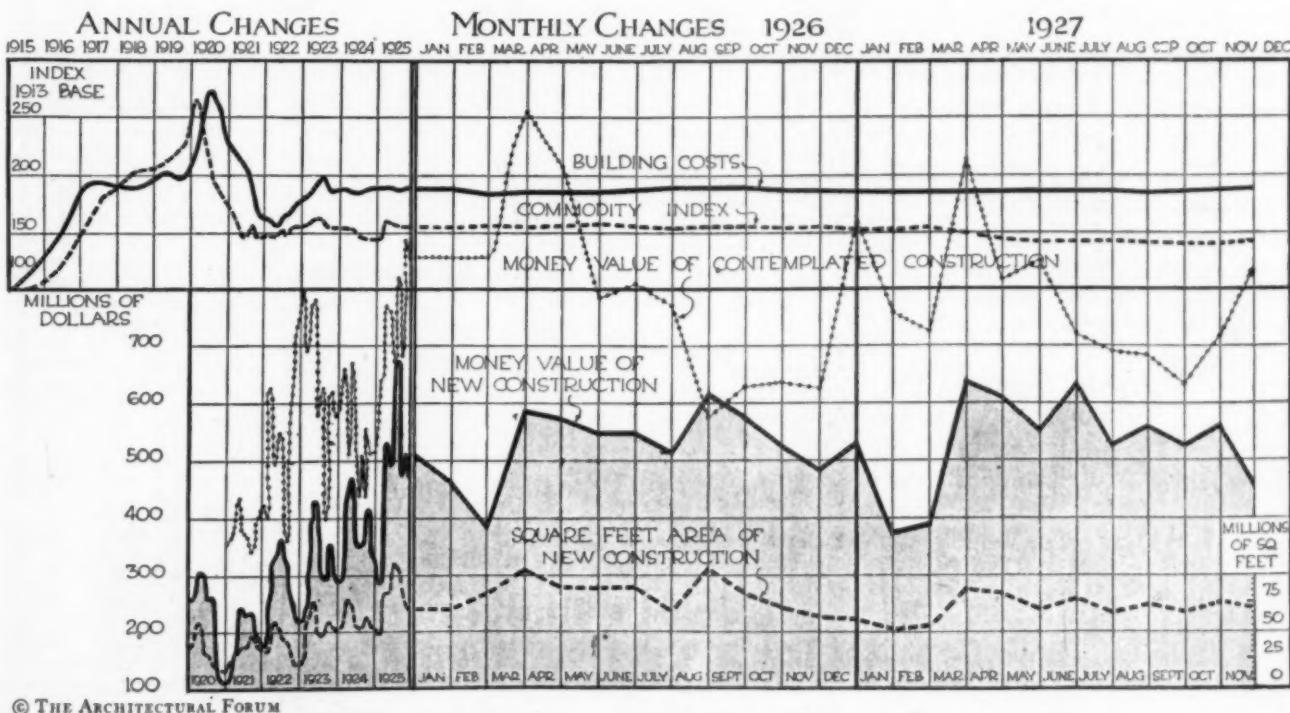
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No. 2



Huge Building Volume to Continue Uninterruptedly Through 1928

According to the Seventh Annual Building Forecast of the Architectural Forum

By C. STANLEY TAYLOR

THE building records of the year just passed indicate that construction activity has continued at a pace almost equal to that of the record-breaking year, 1926. Including engineering projects and construction in the rural districts, it is evident that the total annual building volume of this country during 1927 has been well over seven billion dollars.

In January of 1927 *The Architectural Forum* issued a forecast that building activity for the year would be ten or twelve per cent less than in 1926. Events have proven this forecast to have been more than

safely conservative, because the actual building construction, not including public works and utilities, was evidently only about six per cent less than in 1926. The difference between forecast and fact was, therefore, on the safe side and this fact is pointed out in view of the peculiar difficulties of establishing our forecast for the year 1928, which is here presented.

In attempting to establish this forecast of building activity for the year 1928, we face an unusual and paradoxical condition. On one hand we hear many casually or even thoughtfully expressed opinions in-

dicating that there will be less building activity in 1928 than in several past years. On the other hand, *The Forum's* survey, on which this forecast is based, has been carried out in exactly the same manner used for the last seven years. Here we have actual evidence of work on architects' boards or seriously contemplated for the year 1928—a volume of work which is testified to by 1,793 individual confidential reports from architects.

These figures indicate that building will continue in 1928 at least in the same volume if not reaching even greater totals than 1927.

The forecast figures presented in the accompanying tabulation have been developed by applying a series of weighting factors to the allocated totals of direct reports received from architects. This calculating operation has been carried out in exactly the same manner used each year in establishing *The Forum* forecast. In view of the fact that there has been no deviation in this system and that it has produced successful results for six consecutive years, it would seem obvious that no drastic change in its operation could be expected this year unless some unusual series of business conditions developed suddenly to change the entire economic balance of the country.

If we seek further to analyze this apparently paradoxical situation (wherein many are predicting a sharp falling off of building in the year 1928, although most forecasts are to the contrary), we seem to discover controlling factors of an unusual nature, which, after all, may offer a simple explanation.

It is to be noted that those who are making casual predictions anticipating a considerable decrease in the building volume are located in large centers where there is perhaps an overbuilt situation which would color opinions. Probably, too, the idea of decreased activity in the building field is a natural reaction of the human mind which refuses to believe that good conditions can last so long. This conjecture is substantiated by the fact that most of those who are pessimistic about building activity are also pessimistic about national prosperity. Of course, if general business conditions become adversely affected and the confidence of the public is shaken, building activity will be materially influenced. The volume of building construction and particularly the volume of contemplated construction as expressed by plan filing is not a barometer of business conditions, as it is so often called. It is a mirror of business conditions, and it does not primarily affect prosperity in one way or another, but is in itself an effect of our general business situation. In

Northeastern States

Type of Building	Requirements for New Buildings by Percentages		
	1927	1928	Change
Automotive	2.5	5.4	+2.9
Banks	4.5	3.4	-1.1
Apartments	6.	3.3	-2.7
Apartment hotels	2.	.2	-1.8
Clubs, fraternal, etc.	3.	3.4	+ .4
Community and memorial	1.1	1.	- .1
Churches	10.9	6.4	-4.5
Dwellings (under \$20,000)	3.	6.4	+3.4
Dwellings (\$20,000 to \$50,000)	2.	3.7	+1.7
Dwellings (over \$50,000)	2.	2.8	+ .8
Hotels	5.6	6.9	+1.3
Hospitals	4.8	7.3	+2.5
Industrial	11.9	5.8	-6.1
Office buildings	8.9	8.5	- .4
Public buildings	8.	7.8	- .2
Schools	15.	13.6	-1.4
Stores	1.4	3.8	+2.4
Theaters	5.4	7.	+1.6
Welfare, Y. M. C. A., etc.	2.	3.3	-1.3

North Atlantic States

Type of Building	Requirements for New Buildings by Percentages		
	1927	1928	Change
Automotive	2.1	3.9	+1.8
Banks	4.5	4.2	- .3
Apartments	18.5	20.	+1.5
Apartment hotels	6.6	3.3	-3.3
Clubs, fraternal, etc.	3.5	2.6	- .9
Community and memorial	1.6	.8	- .8
Churches	5.6	2.9	-2.7
Dwellings (under \$20,000)	2.3	4.4	+2.1
Dwellings (\$20,000 to \$50,000)	2.2	4.	+1.8
Dwellings (over \$50,000)	1.9	2.6	+ .7
Hotels	5.2	6.2	+1.
Hospitals	7.1	6.	-1.1
Industrial	7.5	4.6	-2.9
Office buildings	10.9	8.	-2.9
Public buildings	5.7	7.1	+1.4
Schools	8.1	11.4	+3.3
Stores	2.4	3.1	+ .7
Theaters	3.	2.5	- .5
Welfare, Y. M. C. A., etc.	1.3	2.4	+1.1

Southeastern States

Type of Building	Requirements for New Buildings by Percentages		
	1927	1928	Change
Automotive	4.6	4.8	+ .2
Banks	2.3	1.3	-1.
Apartments	8.4	8.2	- .2
Apartment hotels	3.2	2.9	- .3
Clubs, fraternal, etc.	5.2	1.7	-3.5
Community and memorial	1.	.3	- .7
Churches	6.9	7.4	+ .5
Dwellings (under \$20,000)	4.	5.1	+1.1
Dwellings (\$20,000 to \$50,000)	4.2	4.7	+ .5
Dwellings (over \$50,000)	1.1	4.	+2.9
Hotels	15.	11.7	-3.3
Hospitals	5.	5.1	+ .1
Industrial	2.	4.2	+2.2
Office buildings	5.	5.8	+ .8
Public buildings	4.	2.9	-1.1
Schools	13.8	21.6	+7.8
Stores	8.	3.	-5.
Theaters	4.	2.5	-1.5
Welfare, Y. M. C. A., etc.	2.3	2.8	+ .5

Southwestern States

Type of Building	Requirements for New Buildings by Percentages		
	1927	1928	Change
Automotive	2.8	4.8	+2.
Banks	2.	2.8	+ .8
Apartments	8.	6.2	-1.8
Apartment hotels	2.	3.6	+1.6
Clubs, fraternal, etc.	4.	4.1	+ .1
Community and memorial	5.2	1.5	-3.7
Churches	10.2	5.8	-4.4
Dwellings (under \$20,000)	3.5	4.5	+1.
Dwellings (\$20,000 to \$50,000)	4.	3.4	- .6
Dwellings (over \$50,000)	1.5	3.1	+1.6
Hotels	10.8	12.5	+1.7

Hospitals	5.2	5.9	+ .7
Industrial	5.3	3.4	-1.9
Office buildings	13.7	15.9	+2.2
Public buildings	2.9	4.9	+2.
Schools	12.5	12.8	+ .3
Stores	2.	2.2	+ .2
Theaters	3.2	1.	-2.2
Welfare, Y. M. C. A., etc.....	1.2	1.6	+ .4

Middle States

Requirements for New Buildings
by Percentages

Type of Building	1927	1928	Change
Automotive	3.2	3.8	+ .6
Banks	2.6	1.9	- .7
Apartments	10.	10.6	+ .6
Apartment hotels	3.	6.	+3.
Clubs, fraternal, etc.....	5.	4.9	- .1
Community and memorial.....	2.	2.4	+ .4
Churches	6.	4.1	-1.9
Dwellings (under \$20,000).....	2.	2.8	+ .8
Dwellings (\$20,000 to \$50,000).....	2.4	2.1	- .3
Dwellings (over \$50,000).....	1.1	1.8	+ .7
Hotels	5.7	6.	+ .3
Hospitals	4.9	6.3	+1.4
Industrial	8.6	6.9	-1.7
Office buildings	16.6	15.	-1.6
Public buildings	4.	7.5	+3.5
Schools	13.6	9.3	-4.3
Stores	1.6	2.3	+ .7
Theaters	5.8	4.1	-1.7
Welfare, Y. M. C. A., etc.....	1.9	2.2	+ .3

Western States

Requirements for New Buildings
by Percentages

Type of Building	1927	1928	Change
Automotive	3.6	3.	- .6
Banks	2.	1.2	- .8
Apartments	9.8	11.7	+1.9
Apartment hotels	4.3	5.9	+1.6
Clubs, fraternal, etc.....	6.3	2.3	-4.
Community and memorial.....	1.9	1.7	- .2
Churches	6.2	6.1	- .1
Dwellings (under \$20,000).....	3.	4.3	+1.3
Dwellings (\$20,000 to \$50,000).....	2.3	4.	+1.7
Dwellings (over \$50,000).....	1.9	2.7	+ .8
Hotels	11.3	6.9	-4.4
Hospitals	3.9	6.3	+2.4
Industrial	2.9	3.7	+ .8
Office buildings	11.6	14.2	+2.6
Public buildings	9.6	4.7	-4.9
Schools	13.9	13.3	- .6
Stores	2.1	4.1	+2.
Theaters	2.4	2.8	+ .4
Welfare, Y. M. C. A., etc.....	1.	1.	...

National Percentages, U. S. A.

Requirements for New Buildings
by Percentages

Type of Building	1927	1928	Change
Automotive	2.8	3.9	+1.1
Banks	3.3	2.8	- .5
Apartments	12.5	13.2	+ .7
Apartment hotels	4.3	4.4	+ .1
Clubs, fraternal, etc.....	4.3	3.5	- .8
Community and memorial.....	2.	1.5	- .5
Churches	6.5	4.3	-2.2
Dwellings (under \$20,000).....	2.4	4.	+1.6
Dwellings (\$20,000 to \$50,000).....	2.4	3.3	+ .9
Dwellings (over \$50,000).....	1.9	2.4	+ .5
Hotels	6.9	6.9	...
Hospitals	5.6	6.2	+ .6
Industrial	7.3	5.3	-2.
Office buildings	12.7	11.8	- .9
Public buildings	5.6	6.7	+1.1
Schools	11.7	11.5	- .2
Stores	2.2	2.9	+ .7
Theaters	3.9	3.3	- .6
Welfare, Y. M. C. A., etc.....	1.7	2.1	+ .4

prosperous times we build in huge volumes to meet not only the various necessary normal needs for new space, but to fulfill the requirements

of increased standards of commercial and domestic housing which are in keeping with the ability to pay for greater comfort and utility.

With these thoughts in mind, is it not reasonable to believe that there may be a basic explanation for the evident paradox of contrary opinions as to building activity? Perhaps we have not been passing through a real "boom"—perhaps the continued building activity which, as an examination of the accompanying chart, "The Building Situation at a Glance," will show, has been carrying on in increasing volume since 1922, is primarily based on greatly increased building requirements coupled with prosperous conditions which have provided the means for this great investment.

After all, the population of this country during the past ten years has increased by many millions for which shelter of all kinds must be provided. The tremendous volume of existing construction which has been added each year must of necessity require constantly greater building activity to take care of obsolescence and replacements. The fire losses grow greater each year in spite of efforts to curb them, but it may be noted that they do not grow larger in proportion to the total number of buildings. They grow larger because the total area of risks has been tremendously increased. Naturally, replacements to meet fire losses must grow larger as the requirements become greater.

We have also to consider seriously the greatly increased standards of living. The average family requires better shelter with a greater degree of attractiveness, comfort and utility. Similarly in business buildings of all kinds builders must meet a demand which has grown amazingly in respect to the factors of quality and efficiency.

We predict, therefore, that the building activity of the year 1928 will approximately equal that of 1927 and that over the next few years there will be no general collapse of the situation but rather a gradual return to a new normal much higher than that established in any previous decade.

Of course, there will be changes in the totals of various types of building which go to make up this

BUILDING TYPES	N. EASTERN STATES	N. ATLANTIC STATES	S. EASTERN STATES	S. WESTERN STATES	MIDDLE STATES	WESTERN STATES	U.S.A.
Automotive	\$16,702,000	\$68,716,000	\$8,214,000	\$17,554,000	\$67,605,000	\$18,640,000	\$197,431,000
Banks	10,674,000	72,693,000	2,278,000	10,202,000	34,300,000	7,247,000	137,394,000
Apartments	10,437,000	347,500,000	13,862,000	22,400,000	186,400,000	72,230,000	652,829,000
Apartment Hotels	572,000	56,787,000	4,970,000	12,935,000	105,987,000	36,267,000	217,518,000
Club, Fraternal, etc.	10,557,000	46,287,000	2,937,000	15,000,000	86,742,000	14,440,000	175,963,000
Community and Memor.	3,146,000	13,400,000	580,000	5,265,000	41,760,000	10,645,000	74,796,000
Churches	19,860,000	48,740,000	12,635,000	20,900,000	71,367,000	37,640,000	211,142,000
*Dwellings (Below \$20,000)	19,780,000	76,730,000	8,700,000	16,360,000	49,400,000	26,372,000	197,342,000
Dwellings (\$20,000 to \$50,000)	11,420,000	69,210,000	7,935,000	12,150,000	37,610,000	24,640,000	162,965,000
Dwellings (Over \$50,000)	8,700,000	44,935,000	6,720,000	11,345,000	31,210,000	16,660,000	119,570,000
Hotels	21,487,000	107,272,000	19,950,000	45,175,000	105,200,000	42,917,000	342,001,000
Hospitals	22,724,000	104,210,000	8,715,000	21,320,000	110,114,000	39,200,000	306,283,000
Industrial	18,215,000	79,362,000	7,100,000	12,222,000	121,000,000	22,917,000	260,816,000
Office Buildings	26,376,000	139,674,000	9,854,000	57,473,000	263,413,000	87,720,000	584,510,000
Public Buildings	24,207,000	122,761,000	4,893,000	17,869,000	132,171,000	28,900,000	330,801,000
Schools	42,371,000	197,613,000	36,827,000	46,282,000	163,413,000	82,666,000	569,172,000
Stores	11,780,000	54,776,000	5,103,000	8,086,000	39,763,000	26,713,000	146,221,000
Theaters (All Types)	21,920,000	43,114,000	4,167,000	3,777,000	71,620,000	17,340,000	161,938,000
Welfare Y.M.C.A., etc.	10,140,000	41,614,000	4,700,000	5,731,000	38,246,000	6,143,000	106,574,000
TOTAL VALUE OF NEW BUILDINGS	\$311,068,000	\$1,735,394,000	\$170,140,000	\$362,046,000	\$1,757,321,000	\$619,297,000	\$4,955,266,000
New Construction Under Architect's Specifications							\$4,955,266,000
As shown in above tabulation							
*Small Dwellings Not Designed by Architects							789,368,000
Estimated about 80% of total							
†Industrial Buildings Not Designed by Architects							260,816,000
Estimated 50% of total							
Other Buildings Not Designed by Architects							499,678,000
Estimated at 10% of total after deducting above two classifications							
TOTAL ESTIMATED EXPENDITURE FOR NEW BUILDINGS IN 1928							\$6,505,128,000
							(Not Including Public Works and Utilities)

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DETAILED FORECAST of NEW BUILDING CONSTRUCTION for 1928

volume of building. An examination of the following tabulations will serve to give some idea of the 1928 requirements for new construction as compared with those of a year ago. This expression is in both instances the result of similar methods used by the *Architectural Forum* for obtaining such information. Consequently the percentages given should constitute a fairly accurate gauge of national requirements for various types of buildings and those of the geographical divisions presented in the tabulation. The national percentages indicated for 1928 show greater activity in the construction of automotive buildings, residential buildings of all kinds, public buildings and welfare buildings. There is evidently to be a decrease in the amount of bank building, club and fraternal

buildings, community buildings, churches and office buildings. Hotels and apartment hotels are evidently to develop approximately the same volume. School building will be approximately the same, while the demand for theaters shows a slight falling off.

Examining comparative conditions of demand for new buildings in the different geographical sections of the country as presented in these tabulations, we find the more striking changes to include a developed demand for automotive buildings in the Northeastern States, with a considerable increase in the North Atlantic and Southwestern States. We find the requirements for bank buildings falling off everywhere except in the Southwestern States. The figures for apartment buildings indicate a sharp drop in

requirements in the Northeastern States to almost half the total of last year. On the other hand, in the North Atlantic and in the Western States there is a slight increase in requirements. Apartment hotels show a sharp falling off in the North Atlantic States, but double the requirements of last year in the Middle States. While the demand for apartment buildings has fallen off sharply in the Northeastern States, the requirements for individual dwellings of all types have increased materially, particularly for dwellings under \$20,000.

In the hotel field the Northeastern and North Atlantic States indicate an increased demand in spite of the great activity which has taken place in this section of the country. There is an increased demand in the Northwestern States

for new hotels, but a sharp falling off in the Western States. The total indicates exactly the same percentages for 1928 as shown in 1927, which is somewhat unexpected as the hotel industry has not been looking forward to as much building activity in 1928 as in 1927. Of course, it may be that economic conditions in the hotel field will prevent the carrying out of a number of projected operations, but on the other hand, there will unquestionably be the greatest volume of remodeling ever known to this particular industry.

Other interesting comparisons will be found in studying the figures shown for the various types of buildings. For instance, the South-eastern States indicate a greatly increased demand for school buildings, while in the Northeastern and Middle States there has evidently been a falling off of requirements for educational structures.

It is predicted that building activity during the year 1928 will carry along in a much stronger manner than has been generally anticipated and that any decrease in volume which might be the result of lessened activities on the part of speculative builders will in turn be offset by a number of large investment and institutional projects which have been held in abeyance during 1926 and 1927.

Lamneck Out with New Round Tin Pipe Construction

The December issue of *Fittings Remarks*, that interesting little publication of the W. E. Lamneck Company, Columbus, Ohio, carries an item of interest to the trade on the new construction. The announcement is to the effect that the company has adopted a new joint construction for all round tin pipe.

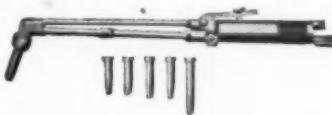
The construction is explained as follows: Before crimping the joints the raw edges are folded in and the female end is belled slightly for a fraction of an inch back from the edge. This is said to produce a pipe that has very rigid ends without

raw edges, and makes assembly as easy as dropping one ice cream cone within another.

The new construction, it is also stated, adds greatly to the rigidity of tin pipe, giving the strength of a much heavier gauge than is actually paid for. It also diminishes distortion due to handling. The new construction was adopted on Lamneck products on January 1st and will be used on all round tin pipe and elbows and on the round end of all tin fittings. The added cost of this construction is not being passed on to the customer.

Produces a New Lightweight Combination Cutting and Welding Torch

The Alexander Milburn Company, Baltimore, Maryland, manufacturers of welding and cutting apparatus, recently developed a new lightweight torch which cuts or welds with the mere interchange of



The New Torch

tips. It is made to operate with their oxygen and acetylene, oxygen and hydrogen or other gases.

This torch, known as the Milburn Type RI, has all the features of the Milburn combination cutting and welding torch, Type NI. This latter is the original 2-purpose torch, cutting or welding the lightest or heaviest metals within range of the process by a mere change of the tips. It obviates the necessity of using two torches, also of disconnecting hose from the torch valves when changing from cutting to welding operations or vice versa.

The Milburn Type RI torch weighs 40 ounces. This weight is advantageous to the operator for continuous work. It cuts upwards of 12 inches in thickness.

Some important features of the lightweight combination torch are: the torch has only two gas tubes (made of stainless steel) instead of

three tubes common in other torches; the high pressure cutting oxygen thumb button which remains fixed in either open or closed position without sustained pressure from the thumb; the forged bronze torch head and valves having a tensile strength of 60,000 pounds per square inch; designed for strength for severe work and for lightness for continuous operations; it uses the heat to the best advantage while affording protection to the hands of the operator; all valves readily accessible; well-balanced; easy to handle; and the supermixing of gases resulting in a neutral, uniform flame as well as the elimination of flashbacks. You can put the nose of the torch into the molten metal—you can burn the tip—the torch works on just the same.

Booklet No. 172 describing the Types RI and NI torches as well as other torches, regulators and acetylene generators, will be sent upon request to The Alexander Milburn Company, 1416-1428 West Baltimore Street, Baltimore, Md.

L. Wayne Arny Resigns to Go with Richardson & Boynton

L. Wayne Arny, director of public relations of the National Warm Air Heating and Ventilating Association, has resigned his position with that association and has accepted a position with Richardson & Boynton Company, New York City.

Mr. Arny was selected to conduct the publicity work of the National Warm Air Heating and Ventilating Association several years ago when that work was undertaken by the association. The work has gone forward uninterruptedly under Mr. Arny's direction since its inception. The success he has had with his work is well known to every one in the industry.

It is not known as yet who will succeed Mr. Arny, but arrangements have been made to continue the association's publicity and advertising program.

Sheet Metal Cupolas Greatly Reduce Farm Fire Hazards

Excess Moisture Removal from Cattle Barns Aids in Maintaining Health of Cattle

By PROFESSOR A. J. MACK*

THIS is the fifth of a series of articles on Farm Ventilation. In this article the discussion of the ventilation of dairy barns which was started in the fourth article will be concluded. In the last article the needs and general plan of dairy barn ventilation were discussed and some of the details of the arrangement of the systems will be mentioned in this article.

Proper control and satisfactory operation of the dairy barn ventilating systems is dependent upon having all other openings to the buildings closed. Open windows, doors, and open hay or feed chutes are detrimental to satisfactory operation of a ventilating system. Particular care must be given to the location of outtake and intake openings.

Outtakes

It is customary to arrange the outtake flues in pairs. Their location is dependent upon the direction in which the cows face. If the cows face inward the outtakes should be on the outside walls, and if the cows face outward the flues should be in the center of the barn. The idea is to bring the fresh air in from the front of the animals and remove it at the rear. In any installation horizontal runs in outtake flues should be avoided on account of decrease in effectiveness. Each pair of flues can well be connected to one ventilator on the ridge of the barn. A small number of adequate outtakes is to be preferred to a large number of smaller outtakes, as less cooling of air and condensation results. The total area of the outtakes is dependent upon the number of animals to be housed. Experiment Station bulletins speak

of approximately 30 square inches per animal. Well-insulated, round metal flues are being favored in the better ventilated barns, as they are smooth and efficient and cracks do not open up as in wooden flues.

Intakes

In the location of intakes it is customary to distribute the openings more widely; as a result there are more of them and they are of smaller size. This method gives more even distribution of the air without serious chilling effects as might occur with fewer larger openings. Care must be used in the location of the intakes to avoid back drafting. Areas in which air whirls are produced are especially susceptible to back drafting. A United States Department of Agriculture bulletin states that back drafting is minimized when intakes are placed eight or more feet from any corner. This bulletin also states that the outside openings of the intakes should be at least five feet below the inside opening for reduced back draft.

Automatic valves have been developed, however, for the prevention of back drafting, making possible the elimination of the vertical sections of the intakes. When the automatic valves are used great care must be used in their installation or they will not function properly.

The area of the intakes may be regulated by a sliding or hinged door. This is to be preferred to the warm air furnace register which has been used in some cases. The intakes should be screened only on the outside, the inside being left open except for control.

Operation

Since barn ventilation systems are not entirely automatic, their successful operation is dependent upon proper control. The attendant must keep constant watch over wind and

weather conditions. Only in this way can temperature, humidity and proper air circulation be maintained. The attendant must regulate the system to guard against back drafts. He must guard against excessive drafts in any location. He must guard against sudden temperature change and must to some extent control the humidity. Before this can be successfully accomplished he must have definite knowledge concerning the requirements of a successful system and must understand the control of the system.

Stock Barn Ventilation

On the average farm where specialized farming such as dairying is not carried on the barn is intended for a general purpose. In addition to housing the stock, provision is made for grain and hay storage as well. In such barns the extensive ventilating systems often employed in the dairy barns are seldom used. The same general principles of ventilation, however, apply. In the colder sections of the country where warmer barns are necessary a ventilating system is especially desirable. The well-designed system is very important in the removal of surplus moisture and also serves to conserve heat. Barns should, of course, always be kept clean to reduce odors to a minimum. The ventilating system is always an aid in the elimination to a large extent of the odors common to stock shelters.

For tightly constructed barns the King or Rutherford systems or modifications of either could well be used. These systems have been described previously in this series of articles.

Should the installation of an extensive ventilating system not be warranted and the use of hay chutes be resorted to for outtakes ventilators of ample capacity should be provided on the roof. These will

*This is the fifth of a series of articles on Farm Ventilation written by Professor A. J. Mack of the Kansas State Agricultural College, Manhattan, Kansas, with the objective in view to show the sheet metal contractor can increase his rural sheet metal sales.

take care of the elimination of the moisture which would otherwise condense and result in mold and decay of the hay, also of the building materials.

Titling windows with sheet metal ventilating shields such as mentioned in the previous article could also be employed. In designing a system for a barn the ventilating air requirements per animal should be about 65 to 75 cubic feet per minute for horses, 55 to 60 for cattle and 12 to 15 cubic feet for sheep. This is in accordance with figures given in government and state experiment station bulletins. The air exits must then be ample to take care of the maximum number of animals of all kinds expected to be housed in the structure.

It has been the custom in times past to place a cupola with slatted louvres on barns of practically all types. A well-designed automatic ventilator is much better than the cupola. It is much more efficient as an air ejector and if well designed it is not subject to back-drafting.

A good roof ventilator would do much toward dissipating heat developed in hay or grain storage spaces also.

This article has been a continuation of the previous articles and is entirely descriptive of the material in the previous article.

In the next article of the series the ventilation of the poultry house on the farm will be discussed by Professor Mack.

tionery, stamps and stenographic work amounting to \$45.85 was presented, approved and ordered paid. Also a bill from the treasurer in amount of \$2.50 for postage stamps was approved and ordered to be paid.

On motion by Mr. Jeske, seconded by Mr. Hammann, the secretary was instructed to write the Building Industries Committee of the Association of Commerce when the revised addition on the Code of Fair Practice would be ready.

The treasurer's report showed a cash balance on hand January 4th of \$118.47. The Auditing Committee composed of Mr. Bielow and Mr. Bauer reported the treasurer's books for the year 1927 to be in order.

On motion by Mr. Jeske, seconded by Mr. Pluckhan, it was decided that the dues to our organization should again be revised to those in force before the Employers' Council was joined. The president also is to select a committee to go over carefully the affairs of our organization, and to report back at our next meeting with their proposals. The committee chosen was O. Hoffmann, H. Pluckhan and T. Tonnsen.

Mr. Hammann made a motion, seconded by Mr. Bauer, that the secretary should receive \$25.00 a year for his work.

The chair then called for nominations for office and the following slate was unanimously chosen without opposition: President, L. F. Reinke; first vice-president, John F. Graf; second vice-president, Joe G. Bauer; secretary, Walter Bielow; treasurer, Henry Pluckhan; sergeant-at-arms, R. Klubertanz.

Service Metal Supply and Mfg. Corp. Head Dies Suddenly

Fred Weber, president of the Service Metal Supply and Manufacturing Corporation, 1498 Fulton Street, Brooklyn, New York, died on December 31st, 1927. Mr. Weber's death was entirely unexpected and he is mourned by all those with whom he had daily contact.

L. F. Reinke Becomes President Master Sheet Metalers of Milwaukee

*Secretary Voted to Receive \$25
a Year for His Services.*

THE Master Sheet Metal Contractors' Association of Milwaukee held its regular monthly meeting Monday evening, January 9, 1928.

The meeting was called to order at 8:15 o'clock with President Schumann in the chair and 18 members answering to the roll call.

The minutes of the December meeting were read and approved.

A letter from Geo. Harms, chairman of the Trade Development Committee of the National Association Sheet Metal Contractors of the United States, was read. Herein Mr. Harms asked for co-operation in carrying through the fulfillment of the committee in publishing the Trade Development Book. Mr. Paul L. Biersach, national president, spoke very enthusiastically on the merits of the book and stated that it was confidently expected that the book would be ready for distribution for the Cleveland convention. All expressed a warm desire to aid in this worthy movement by sending in their subscription for one or more books.

Several orders were immediately placed for one or more copies. The secretary was further instructed to get in touch with all absentees in order to secure their orders also.

A letter of resignation was read from H. J. Bretzel. This was due to their company discontinuing in the sheet metal line. On motion by O. Hoffmann, seconded by T. Tonnsen, it was voted to accept this resignation, and the secretary was instructed to inform them of the action taken.

The letter written by W. C. Markle to all those to whom subscription to the National Sheet Metal Contractor had been sent was then read. A discussion ensued as to the best way to proceed in interesting these contractors to the advantage in having membership in the local association. It was finally decided to act as a body in calling on them. The secretary called the names and those that wanted to call on the prospect were appointed to do so in an endeavor to secure their membership.

A bill from the secretary for sta-

How to Get Salesmen to Collect Money from Delinquent Customers

Employ Forms Which Cause Salesmen to Commit Themselves on Customer's Condition

FOR the first ten years of our business we did not ask our salesmen to collect at all; it was not customary in our business, and we let it go at that. As long as we did not ask them you can bet they didn't do it. There was virtually no collecting by salesmen. In fact, we thought it was old-fashioned. A good many of our competitors in old lines like hardware and saddlery and electrical lines did do it, and we thought we knew a better way. Eventually we found we did not.

Our credits and our collections became harder all the time, and we found we must have another way beyond the ordinary ways that we were using. Accordingly, some ten years ago we began asking salesmen to collect. We found that merely asking them didn't do much good, not much more than not saying anything about it at all. They just didn't do it.

We then began to work out ways to get them to collect. Our first plan was the natural one of giving them statements on past due accounts. Of course, we went through all the usual talk of telling them they couldn't sell certain customers unless they did collect from them. Our salesmen work entirely on commission, and they are intensely interested in their own success, so they found out for themselves that if a certain customer's credit was jeopardized they could not sell him anything because the credit department would not pass the order. We stressed that again and again, and we still stress it. We believe it is probably our best way of getting a salesman to make a collection. Otherwise his field is decidedly narrowed.

However, after we had exhausted that plan we also found that sending out the statements was not suffi-

cient. The men ignored them, they even denied receiving them, they forgot them, they gave all kinds of excuses, and we never had a good enough check on the men to see whether the excuses were valid or not. So we entered into our report plan a collection report. Our report plan is a little different from many of yours, but it can be easily adapted to any system, and I will explain it our way and you can see how it could be put into your own business.

We have a report blank, and when we get a salesman's route it goes at once to the cards. We try to get 100 per cent records of potential customers in every town; I mean by potential the ones that the salesman should call on.

This blank report is not dated, because he might not make the town the day we have the report dated, but it carries his name and the name of the town and the names of the potential customers. He doesn't make out this report; we make it out for him as soon as we get his route sheet, and we send it right to him.

There are columns opposite these names which are headed with the various classifications of the call. The man has nothing to do but make check marks in the columns. The first column says, "Saw customer and made no sale," "Did not see customer," and several such headings. The man can fill out an ordinary report in five minutes.

That was our regular form that we used for years and we like it very much. In the last two years we have added one more column, and it is the first one next to the name. It says, "Past due account." As soon as that report is made out by the card clerk, it goes to the credit department and they enter the amount of the unpaid balance

opposite the customer's name. We used that for several years quite successfully. The man has to fill out and return the identical report we send him, therefore admitting that he got it and admitting that he knew the customer owed the money and admitting everything. He commits himself when he returns the report. He doesn't make it out; we make it out. If he doesn't return it we ask for it. We keep that up religiously.

We found this a wonderful help in getting the men to make these collections. In the last year we have added to that by also enclosing a statement. We found it desirable to do that because the customer disputed the account or the amount of it or the sequence, or something, and we found that it was very desirable for the man to have a statement as well as simply the actual amount past due.

When the man makes out his report at night he must say something about these amounts. If he collects the money he checks it. He doesn't have to do anything but pin the check to the collection report. He has a little special report called "Collection Report." If he collects the account, all he has to do is write the customer's name and pin the check to it. If he doesn't collect it he has to write something. Even though he shows that he didn't see the customer, he has to write a collection report on every customer whose name we show as past due.

We find that even if they don't see the customer, they hate to turn in that report; they stay a while to see him. We write and tell them they are not seeing enough customers, they are not waiting long enough, or they are not going back.

The men are beginning to take an active interest in collections the same as in their sales. They have to

tell just what they did and admit their deficiencies if they don't collect.

Our collections through the men have increased tremendously, and the effect on the customer has been very much improved. The men must see the customer. If they don't see him in two or three times, they know they will get a letter from us saying they have to see that customer on the next visit. If they ask the customer for it, even though they don't get it, it shows that the credit department knows that man owes, and is paying attention to it. In the end, the man has to report what he collected, and if not, why not.

About all I can say is that it is working splendidly, and the only kick-back has been that the men oc-

casionally object on the ground that we are constantly after them and they are constantly after the customer whose account is a little past due. That objection doesn't amount to very much. We are very glad to do it and we want to do it that way. If it is an imposition on the customer and we are asking too much, the man has to use his own judgment, but even then he has to explain to us that he doesn't believe it is best to ask the man for it because it is only a small amount or is only slightly past due. If you get the man to think that much about the collection to write a good report, even though he doesn't make the collection, you have accomplished something with the man and probably with the customer, which is worthy of note.

Louisville Ladies' Auxiliary Hold Card Parties to Meet Expenses

of Their Trip to National Convention in Cleveland

THE Ladies' Auxiliary to the Louisville Sheet Metal Contractors' Association will give a banquet and dance in the Tyler Hotel, Louisville, Kentucky, January 26, in honor of their newly elected officers.

The officers are as follows: President, Miss Georgia Merrick; First Vice President, Mrs. Charles Harpring; Second Vice President, Mrs.

Jacob Bailen; Treasurer, Miss Dorothy Harpring; Secretary, Miss Carolyn Fischer; Assistant Secretary, Miss Edna Daschbach; Guard, Mrs. Ferd Schupp; Chaplain, Miss Mary O'Leary; Musician, Miss Carolyn Fischer; Reporter, Miss Virginia Hutchison.

Another social event of the Louisville Ladies' Auxiliary will be a card party given for the benefit of the Go-Wa-Club. This party will be given at the home of the former president, Miss Mary O'Leary, 104 Pennsylvania Avenue, and is one of a series of card parties to be given to raise money for attendance at the Cleveland convention. The Louisville ladies are working hard because they hope to be well represented at the Cleveland Convention.

It will be recalled that it was at Louisville in 1926 that life was breathed into the Ladies' Auxiliary to the National Association of Sheet Metal Contractors, under the guidance of Miss Mary O'Leary, the national president. Since that time the movement to establish state and



Mrs. J. W. Bowers

local Ladies' Auxiliaries has been going forward unabated, and the movement is meeting with considerable success. The wives of sheet metal contractors in all parts of the country are beginning to realize that they can be of real service to the men in the latters' efforts toward betterment of conditions in the industry, and the women have taken a noble resolve to do their utmost in this service.

Mrs. Mary O'Leary is the President of the National Ladies' Auxiliary and the woman who two years ago worked so hard to put the National Ladies' Auxiliary over. Miss Hutchison is the National Secretary. Mrs. J. W. Bowers is also very active in the work of the National Ladies' Auxiliary.



Miss Mary O'Leary



Miss Virginia Hutchison

Construction of Pattern for Spiral Pipe, Riveted, Developed by Triangulation

*as Requested by Mr. Hiatt,
Scranton, Pennsylvania*

By O. W. KOTHE, Principal St. Louis Technical Institute

RESPONDING to the inquiry of Mr. Hiatt, Scranton, Pennsylvania, for a spiral pipe, riveted, will say it appears this response has been delayed unduly, and no doubt an apology is due the subscriber; but the writer does not remember or has no record of such an inquiry in his files of last spring. Then when attention was called in November, the carpenters, plasterers and other workmen were repairing the cyclone damage on our building. But now we are all in shape, and the drawing board is functioning again.

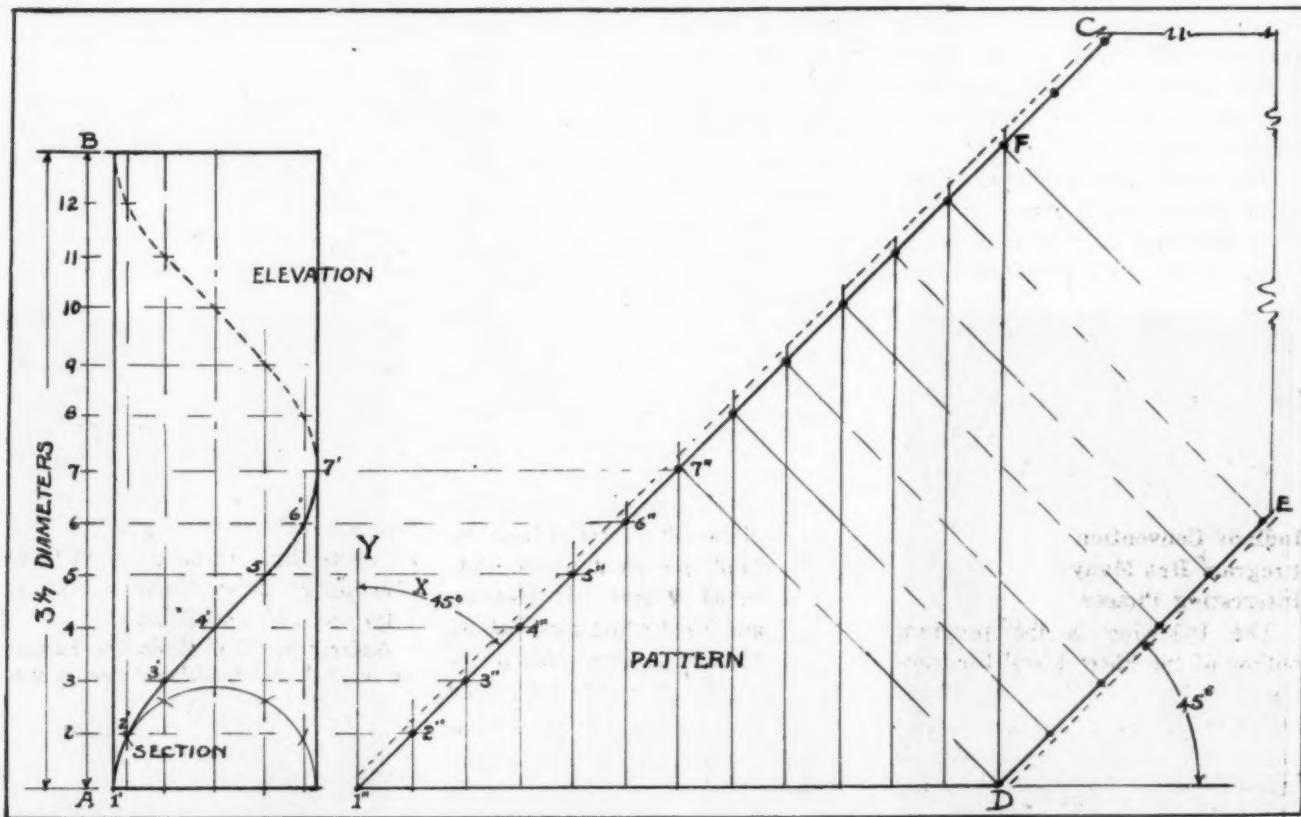
Your diameter of 14 inches does not matter, as that is a flexible item and can be made anything. The gauge of metal can be worked in straight strips up to possibly 14 or 12 gauge—some drifting will be needed; but it can be pulled into

shape all right. For $\frac{1}{8}$ -inch plate or heavier, the difference in thickness must be provided, and the development made by triangulation. That is a tedious process, requiring considerable care and accuracy, or more trouble will be borrowed than the drifting of straight strips will make.

Now the spiral works on the 45-degree angle—so the pattern can be laid out very simply—nothing much to it. Thus we measure the girth of the pipe as 1"-D, which will form the bottom miter of pipe, or straight ends. Then at each end as at 1" and D, use a 45-degree triangle and extend these seam lines as 1"-C and D-E. You can divide the line 1"-F in as many equal spaces as you wish rivets in the spiral circumference, and then project these points to line

D-E, so they are exactly perpendicular to 1"-C. Thus 7" must exactly correspond with D, and be exactly 90 degrees, or perpendicular, while the rest can be marked off toward the end of the strip.

The spiral line 1"-C must be on a 45-degree line, as the angle X indicates, or the points 7" and D will not match, and this will require the special location of rivet holes along the line D-E. If you wish to do this on, then you can make the slope 1"-C anything you wish, and draw D-E parallel to it, and the problem will work itself out. The elevation we show is not needed, and is drawn to further demonstrate the diameter relation with a 45-degree spiral. If you have a definite pitch of elevation as A-B, then you can develop the spiral and project the



Patterns for Spiral Pipe

pattern much as shown.

But if you only have the diameter to work from and wish to develop the spiral pattern to correspond for a 45-degree volute, then you must recall that the circumference of a pipe is found by saying diameter times 3.1416, or $D \times 3\frac{1}{7}$. This is the same as circumference divided by 3.1416, which will give the diameter. Hence we see that the pitch A-B of one revolution of spiral is equal to the circumference 1"-D. So if these facts are associated together there will be no trouble in arriving at a 45-degree spiral, by developing it from the elevation.

The intersection points in pattern can be taken as the rivet hole centers, and in this case we have 12 rivets in one revolution. If you wish more, then space your lines closer together, and if less, then it is better to divide line 1"-F into as many spaces you desire to make the necessary rivet holes.

You will see that D-7" is the width of the strip, and these lines can be run the full length of an 8 or a 10 foot sheet—I mean lines 1"-C and or D-E. For straight ends the miter 1"-D is cut, and that will work itself out. It is no doubt advisable to start this spiral in the rolls, twisting the strip over in a diagonal position to make the spiral. After a few rounds have been rolled the metal can be slipped out, and this aids in starting the rivets in a free and uniform way. After a few rivets have been set, the rest of the strip can be wrapped around a stake or bent as you rivet it. It may be well to experiment on a small strip first to see how it works before attempting the real work.

Indiana Convention Program Has Many Interesting Phases

The following is the program outline of the Sheet Metal Contractors' and Indiana Warm Air Heating and Ventilating Associations convention program as it will be carried out at the Denison Hotel, Indianapolis, January 24 to 26, 1928:

Tuesday, January 24

Registration.

10:00—Directors' meeting of the Sheet Metal Contractors' Association.
 11:00—Directors' meeting of the Warm Air Heating and Ventilating Association.
 11:30—Directors meeting of both associations in joint session.
 1:00—General meeting of Sheet Metal Contractors' Association.
 1:30—General meeting of Warm Air Heating and Ventilating Association.
 3:00—General meeting of Joint Associations and election.

Wednesday, January 25

9:00—Question Box.
 "Selling It Is the Job," by Stanley A. Knisely, director of publicity for the Sheet Steel Trade Extension Committee.
 "Building Public Appreciation of the Sheet Metal Industry," by Harvey A. Call of the Copper and Brass Research Association.
 1:30—"Helpful Hints on Selling," by George J. Duerr, Editor of the AMERICAN ARTISAN.
 "Insurance to Members at a Saving," by C. F. Stothard of the Hardware Mutual Casualty Company.
 "Let's All Be Good Fellows Together," by O. Voorhees, president of the Century Heating Service Company.

Thursday, January 26

9:30—Question Box.
 "Keeping Yourself Before Your Trade," by E. C. Carter.
 "Selling Warm Air Heating Nationally," by Chas. E. Hall, president of the National Warm Air Heating and Ventilating Association.
 "Latest Developments in Warm Air Heating," by Prof. J. D. Hoffman of Purdue University.
 1:30—"Organization," by Jere Doherty of Follansbee Bros.

2:30—"It Can Be Done—Because It Is Being Done," by Edwin A. Scott.

6:30—Banquet and entertainment.

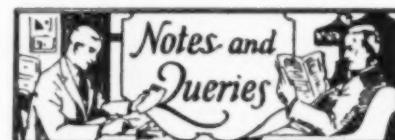
The exhibit will be open Tuesday evening and Wednesday evening, and all during the days, excepting at meeting hours.

Austin & Son, Decatur, Illinois, Change Address of Their Business

Austin & Son, Decatur, Illinois, have changed their address to 1025 East Cleveland Avenue. That Mr. Austin is well pleased with AMERICAN ARTISAN is evidenced by the following statement: "The announcement you carried for us has brought several responses from your advertisers. We are sure from our experience in this instance that your publication is read by the trade." AUSTIN & SON.
 "Decatur, Illinois."

St. Louisians Hold Banquet and Installation of Officers—Dance

The eighteenth annual banquet and installation of officers of the Sheet Metal Contractors' Association, Inc., of the Sheet Metal Consumers' Protective Association, and of the Ladies' Auxiliary of St. Louis, Missouri, was held at the Forest Park Hotel, St. Louis, Saturday evening, January 14th, 1928. Dancing followed the banquet.



Ilg Ventilating Fan

From B. J. Malerich, Arrowhead Sheet Metal Company, 315 Fourth Avenue, International Falls, Minnesota.

Please advise me who manufactures the Ilg ventilating fan.

Ans.—Ilg Electric Ventilating Company, 2850 North Crawford Avenue, Chicago, Illinois.

Address of Oil-O-Matic Oil Burner
 From J. L. Bann, Richland Center, Wisconsin.

Please let me know the address of the manufacturers of the Oil-O-Matic oil burner.

Ans.—Williams Oil - O - Matic Company, Bloomington, Illinois.

Furnace Ordinance Becomes Law in Chicago Without Mayor's Signature

Provision Made in Ordinance for Journeyman Inspectors—Law Has Teeth

LAST minute news flash on the table of contents page of our 34th Warm Air Furnace Annual called attention to the fact that the Chicago City Council had voted adoption of the Standard Furnace Ordinance upon which a committee of Chicago furnace installers, in conjunction with Local Union No. 73, have been working diligently and persistently for quite some time.

This ordinance is said to be the nearest approach to that of the National Warm Air Heating and Ventilating Association. The only change from that ordinance that was made is the stack clauses, which it was necessary to alter in order to meet the union conditions in Chicago.

The Chicago men were very fortunate in being able to tie up licenses of furnace installers with the ordinance. In the future in the city of Chicago it will be necessary for every furnace installer to register at the City Hall and pay a license fee of \$50.00 per year. In addition to the penalties for any installation not in accordance with the Standard Code, a contractor also runs the risk of losing his license, in which event he would not further be permitted to install furnaces in Chicago.

The Greater Chicago Warm Air Heating Association will be very diligent in watching installations in Chicago, and it is felt that within a very short time Chicago will be at the top of the list on good furnace installations.

Thus one of the biggest pieces of work ever attempted by any local warm air heating association came to fruition. The ordinance, as it was adopted, follows:

An ordinance governing the installation of gravity warm air heating plants in the City of Chicago and to be known as "Warm Air Heating Ordinance."

Be it ordained by the Council of the City of Chicago, as follows:

Section One. Definition. A gravity warm air heating plant shall consist of one or more warm air furnaces, enclosed within casings, together with necessary appurtenances thereto, consisting of

Many men in the industry will probably say: "What good will this ordinance be? How can it be enforced?" And other similar questions.

For the edification of those who might ask such questions, let it be said that in addition to passing the ordinance the City Council also voted an appropriation of \$37,200 as annual salaries of ten regular inspectors and one chief inspector. Further, the stipulation is that the inspectors must be full-fledged journeymen.

If the Chicago warm air heating men were able to make themselves heard in the City Council chambers, there is no reason why warm air heating men in cities where the roar of the cannon is not quite so loud cannot meet with equal success.

warm air pipes and fittings, cold air or recirculating pipes, ducts, boxes and fittings, smoke pipes and fittings, registers, borders, faces and grilles, the same being intended for the heating of buildings, in which they may be installed.

Section Two. Minimum Requirements. The provisions of this ordinance shall be held to be the minimum requirements adopted for the protection of health, welfare, sanitation and the safety of the community, and for the protection of

the ultimate purchaser or user of the heating plant.

Section Three. Provisions in Building. The following provisions shall be complied with in any new building wherein a warm air heating plant is to be installed:

(a) Where warm air register boxes, heads, pipes or stacks are to be installed, joists shall be set not less than sixteen inches (16") on centers and shall be butted and not lapped. Studding shall be set directly over and under joists, leaving a space of not less than fourteen inches (14") between studs and joists. Wherever joists are cut, headers must be put in to support joists. In all buildings having studded exterior walls, the floors shall be extended to the outside sheathing and all spaces between studding shall be closed at the attic floor line.

(b) All partition walls (or sections of these walls) in which heat stacks to second or third floor rooms are to be installed, shall be of sufficient size to accommodate stacks required to heat said rooms.

(c) In new construction, it shall be unlawful for anyone to do any cutting of woodwork for the reception of the wall stacks or baseboard registers except the general contractor or the contractor in charge of the work for him, or some duly qualified carpenter working under him. Where it is necessary to cut joists or supporting members, headers shall be put in and braced so as not to weaken the structure.

Section Four. Method for determining sizes of warm air pipes, wall stacks and furnaces.

A. Method for determining sizes of basement warm air pipes.

Rule A—Each first floor room. Divide square feet of glass by 12. Divide square feet of net outside wall by 60.

(See Table A)

Divide cubic contents by 800.
Add together the above and multiply by 9.

The result is the area of the basement pipe.

The sum of:

Glass (sq. ft.) (Par. 5C ÷ 12)
Net Wall (sq. ft.) (Par. 6C ÷ 60) × 9 = Area of Basement Pipe
Cubic Contents ÷ 800)

Rule B—Each second floor room.
Divide square feet of glass by 12.
Divide square feet of net outside wall by 60.

(See Table A)

Divide cubic contents by 800.
Add together the above and multiply by 6.

The result is the area of the basement pipe.

The sum of:

Glass (sq. ft.) (Par. 5C ÷ 12)
Net Wall (sq. ft.) (Par. 6C ÷ 60) × 6 = Area of Basement Pipe
Cubic Contents ÷ 800)

Rule C—Each third floor room.
Divide square feet of glass by 12.
Divide square feet of net outside wall by 60.

(See Table A)

Divide cubic contents by 800.
Add together the above and multiply by 5.

The result is the area of the basement pipe.

The sum of:

Glass (sq. ft.) (Par. 5C ÷ 12)
Net Wall (sq. ft.) (Par. 6C ÷ 60) × 5 = Area of Basement Pipe
Cubic Contents ÷ 800)

B. Basis of working rules for pipes.

These formulæ are for 70 degrees temperature difference, outside temperature zero, inside temperature 70 degrees Fahrenheit. When temperature difference is more than 70 degrees, add 1½% per degree to final figures. When temperature difference is less than 70 degrees, deduct 1½% per degree from final figures.

The values as given in Table A for use in the working rules, Section 4, Rules A, B and C, are derived as follows:

Example—

The factor 60 in Table A, Item

No. 1, is based upon a co-efficient of heat transmission of 0.23 B.t.u. per square foot per degree difference per hour, thus:

$$W \times 0.23 \times 70 \div 111 = \text{sq. in. first floor leader to compensate for}$$

the heat loss through walls only. In this, W equals net area of exposed wall in sq. ft.; 0.23 equals co-efficient of transmission in B.t.u. per sq. ft. per degree difference per hour; 70 equals difference in temperature of air on inside and outside of wall; 111 equals heat delivering capacity of 1 sq. in. of first floor leader pipe for a register temperature of 175° F. Reduced to its

simplest approximate form, this is:

$$\frac{W \times 9}{60}$$

Likewise substitute 167 for second floor and 200 for third floor in place of 111.

The values in Table A for the different types of walls are obtained by substitution of proper co-efficient of heat transmission instead of 0.23

Glass (sq. ft.) (Par. 5C ÷ 12)
Net Wall (sq. ft.) (Par. 6C ÷ 60) × 5 = Area of Basement Pipe
Cubic Contents ÷ 800)

in the above formula.

Table A

The factor 60 used in Section 4, Rules A, B and C, is for buildings constructed as hereinafter set forth in item No. 1. When other types of walls are used substitute the appropriate factor as follows:

No. 1	Frame wall constructed of siding, paper sheathing, studding, lath, and plaster.	60
No. 2	Frame wall constructed of siding or stucco direct to sheathing (no paper), lath and plaster	52
No. 3	9" Brick wall (no plaster)	40
No. 4	9" Brick wall, plastered one side	48
No. 5	9" Brick wall, air space, furred and plastered	65
No. 6	13" Brick wall, no plaster	53

No. 7	13" Brick wall, plastered one side	57
No. 8	13" Brick wall, air space, furred and plastered	75
No. 9	4" Brick, 4" hollow tile, plastered	55
No. 10	4" Brick, paper, sheathing, studding, lath and plaster (brick veneer)	68
No. 11	8" Hollow tile, stucco and plaster	67
No. 12	8" Hollow tile, stucco, furred and plastered	90

Roofs

No. 13	1" T. & G. sheeting, tar and gravel	48
No. 14	1" T. & G. sheeting and composition roof	40
No. 15	1" T. & G. sheeting and tin	24
No. 16	Corrugated iron on strips	9.3

Ceilings

No. 17	Lath and plaster without floor above	50
No. 18	Lath and plaster with tight floor above	90
No. 19	Metal without floor above	40
No. 20	Metal with tight floor above	70

C. Method for Determining Size of Wall Stacks.

1. First floor rooms.
Same as Rule A.
2. Second floor rooms.
Not less than 70% of basement pipe area as determined in Rule B.
3. Third floor rooms.
Not less than 70% of basement pipe area as determined in Rule C.
4. Where one stack is used to convey heat to two rooms, its net area shall be determined by adding together the areas of the two single stacks, which would be required to take care of the heat losses for each room were single stacks used.
5. In obtaining glass surface use full casement opening. An outside door is figured as glass.
6. To obtain net outside wall multiply height by width and deduct the glass in all windows and outside doors. For all rooms with attic spaces immediately above full ceiling areas shall be taken into account, using Table A.
7. For rooms having unusual exposure, ordinarily north, northeast and northwest, add 15% to pipe area. For east and west exposure add 10%.
8. Use no warm air pipe less than 8 inches in diameter. If a basement warm air pipe figures greater area than any standard commercial size, then the nearest commercial size

shall be used, provided, however, that the total pipe area shall in no case be less than the total requirements according to Rules A, B and C.

9. It is understood in using the above values for determining basement warm air pipe areas, that these pipes should be run comparatively straight and that they should not be over 10 to 12 feet in length. Sharp turns and long pipes should have extra capacity.

10. The value of 800 (used in cubic contents) is for an estimated air change of one room volume per hour. If it is desired to provide for $1\frac{1}{2}$ -room volume use the figure 600. If for 2 rooms volume use the figure 400.

D. Transition Fittings and Stocks.

1. Transition from warm air pipes to stacks shall be made with a well-designed elbow or boot, and no stack shall be less than 70% of the area of the warm air pipe leading to it.

2. All first floor fittings and connections shall maintain a free area equal to the round basement pipes leading to them.

E. Method for Determining Size of Registers.

1. All registers shall have a free area at least equal to the area of the basement pipes leading to them.

F. Method for Determining Size of Furnace.

1. Add together the areas (expressed in square inches) necessary for heating the building, as determined by the foregoing *calculated* requirements, Section 4, Rules A, B and C, and install a furnace, rated by the following formula:

Furnace Rating Formula

$$L = 1.75 G (1 + 0.02 (R-20)).$$

L = square inches of warm air pipe connected to the furnace as calculated.

G = grate area in square inches; the area of the firepot at the grate level; its most restricted area.

R = ratio of heating surface area to grate area; 1.75 equals a constant based upon the results obtained on a furnace having 20 square feet of heating surface for

each square foot of grate, and including factors for:

E = efficiency of heater;

C = combustion rate;

F = calorific value of fuel;

0.75 = percentage of heat available at registers.

136 = B.t.u. delivering value of one square inch of pipe, assuming half of the heat is sent to each floor. This value is based on an operating temperature of 175° F. at the register.

The formula allows 1.75 square inches of warm air pipe area for each square inch of grate area, for the furnace having a ratio of heating surface to grate surface of 20 to 1. For furnaces having other ratios of heating surface to grate surface, it adds 2 per cent or deducts 2 per cent for each unit above or below a ratio of 20.

Application:

Grate area, sq. in., equals.....
Heating surface area, sq. in., equals..
Ratio heating surface area to grate
area equals

R-20 equals

Correction per cent equals.....

1.75 G equals.....

$L = 1.75 G$ plus.

Correction equals

casing. Foundation to be level. Where a furnace is to be placed on combustible material, the specifications of the National Board of Fire Underwriters shall be complied with.

C. Setting or Assembling of Furnace

(1) The base ring of the furnace shall be cemented to the foundation, making an air-tight joint. The furnace parts shall be assembled plumb and level, and in a workmanlike manner.

(2) All sections and joints shall be properly fitted. Joints requiring cement shall be well filled and all bolts shall be drawn up tightly.

(3) Every warm air furnace shall be equipped with a water pan

No. 1	No. 2	No. 3
Positive	No.	Negative
Correction	Correction	Correction
346	346	346
7,540	6,920	5,665
area equals	21.8 to 1	20.0 to 1
R-20 equals	1.8	0.0
Correction per cent equals.....	3.6	0.0
1.75 G equals.....	606	606
$L = 1.75 G$ plus.	606	606
Correction equals	628	606
		562

or humidifying device to evaporate moisture in the air.

D. Casings

(1) Warm air furnaces shall be enclosed in metal casings or walls of brick, tile or concrete.

(2) Portable. Sheet metal casings, including casing tops, shall be made of galvanized sheets, not lighter than 26-U. S. Standard Gauge. They shall fit the casings and casing rings closely, so as to be dust-tight, and shall be securely fastened to the front. The casing shall be lined from the upper casing ring down to a line on a level with the grate.

(3) When side collars are used the casing top must be of sufficient height so that the largest warm air pipe can be taken from side without ovaling. In no case shall a distance less than eight inches (8") be maintained between the top of any fur-

B. Foundation

Furnace foundation of brick, cement, or other incombustible material must be provided. Said foundation to extend at least fifteen inches (15") at rear and sides of furnace casing and at least thirty-six inches (36") in front of furnace

nace and the top line of the bonnet.

(4) Any furnace, the casing top of which shall come within twelve inches (12") of a combustible floor, ceiling or joist, shall be protected by a metal shield extending not less than eighteen inches (18") beyond the casing of said furnace. This shield shall be suspended at least two inches (2") below woodwork, allowing free air space between shield and woodwork. No furnace casing or top, coming nearer than six inches (6") of ceiling or joists shall be allowed in any case.

(5) Openings for side casing collars shall be cut into the casing top, so that the tops of all openings are on a level. Casing collars shall be fitted into place with a proper flange, or bead on the outside and drawn up on the inside, making a dust-tight joint. All collars shall be of same size as the warm air pipes to which they are to be connected.

(6) Brick, cement or hollow tile casing shall be constructed as follows: Walls shall be not less than eight inches (8") in thickness, and shall be constructed air-tight. The least inside dimension of rectangular casing shall be the same as that of the portable casing of a corresponding size of furnace. Walls shall be carried to the same height as the portable walls, allowing not less than eight inches (8") between the top of the furnace and the bottom of the top cover. After placing the collars for the warm air pipes, continue the masonry up two inches (2") above the top of the collars, lay single or tee irons across the furnace top, spaced eight inches (8"), cover these with sheet metal not less than 26 U. S. Standard Gauge, cover the sheet metal with masonry or sand, and run the side walls four inches (4") above the roof of the furnace. A galvanized iron casing bonnet may be used on a brick-set furnace.

Provisions shall be made in the walls for a manhole to give egress to heater.

E. Warm Air Pipes in Basement

(1) All warm air pipes shall be made of bright tin not lighter than IC, or galvanized iron. All elbows

shall be made of bright tin not lighter than IC, or galvanized iron, and shall be four-piece, 90 degree. Side seams shall be locked seams. All joints shall be either double seamed or lapped not less than one and one-quarter inches (1 1/4") and such joints shall be match-beaded, or beaded and soldered, or riveted. All pipes and fittings shall be properly secured to ceiling or joist. No soldered or riveted joint is required where round pipe slips over the casing collar or enters boot or box. Any pipe fourteen inches (14") or greater in diameter shall not be made of material lighter than IX tin or No. 26 U. S. Standard Gauge galvanized iron.

NOTE.—It is recommended that all warm air pipes in the basement shall have an upward pitch of not less than one inch (1") per running foot.

(2) All warm air pipes in the basement shall be provided with dampers supported on both sides not more than two feet from the casing.

(3) Where warm air pipes pass through a masonry wall, a metal thimble shall be provided, having a diameter at least one inch (1") greater than the pipe, and the pipe supported in such a manner that the air space is uniform on all sides.

F. Wall Stacks

(1) All wall stacks or wall pipes, heads, boots, ells, tees, angles and other connections shall be made of bright tin or galvanized iron and shall be covered with not less than one thickness of 12-pound per 100 square feet of asbestos paper. All such pipes shall be braced in a proper manner so as not to obstruct the flow of air, but to retain the full capacity throughout. All joints shall be locked and held in place by means of lugs, or straps.

(2) All warm air stacks shall be run in inside walls. Where it is absolutely necessary to run same in outside walls, they shall be insulated with mineral wool or not less than three (3) thicknesses of air cell asbestos paper.

G. Registers

(1) When baseboard or wall reg-

isters are used, they shall be properly and permanently attached to the stack head in such a manner that will prevent any leakage of air between the head and the register.

(2) Floor registers shall be provided with register borders.

(3) Any furnace system having not more than two warm air registers, at least one of the registers shall be without valve or louvers and the pipe thereto shall be without damper.

H. Air Supply to Furnace

(1) The air supply to furnace for warm air heating plants may be taken from outside or from within the building, or may be taken partially from outside and partially from within. In no case, however, shall air be supplied to any furnace from any basement or furnace room.

(2) The cold air intake or return, where air is taken from within the building, shall have a net area throughout its entire length of not less than the combined net area of all warm air pipes leading from the furnace. This may be maintained in one or more ducts. No reverse incline or air trap will be allowed in any section thereof.

(3) When the cold air supply is taken wholly from the outside of the building the supply duct at its most contracted area must equal or exceed 80% of the combined area of all warm air pipes leading from the furnace.

(4) Cold air ducts shall be constructed of metal, tile or other incombustible material having smooth inner surface, and shall maintain a constant net area throughout their entire length and shall be made dust-tight. Horizontal return ducts shall have at least 10% greater area than vertical connecting pipes. Where a boot or shoe is connected to the casing at the base, the opening shall not extend higher than a line on the level of the grate of the furnace. The width of the shoe shall be of proper measurement to make the area at least equal to that of the round or square pipe to which it is connected.

(5) Wherever the space between

joists is used to convey cold air overhead, the joists and all wooden surfaces between such joists shall be lined with metal and a sheet metal pan constructed to extend not less than two inches (2") below said joists. The connection from this pan to the boot or shoe shall be made of galvanized iron not lighter than 26 U. S. Standard Gauge, and shall have a transition collar, the top area of which shall be at least 10% greater than the area of the connecting pipe.

(6) When it is necessary to set the furnace over a pit and connect up cold air under the basement floor, such pit or cold air trench shall not exceed eighteen inches (18") in depth below the casing ring and the width of the trench or trenches shall be of proper measurement to make the area at least equal to the pipe to which it is connected. The connection between the cold air pipe or duct and the underground pit shall be made with converse transition joint.

(7) The cold air face or faces shall be made of wood, or metal. When set in floors the top of same shall be flush with floor. Where cold air face is placed in a seat or side wall the open work of face must extend to within at least one inch (1") of the floor line.

(8) The free area of cold air faces shall be at least equal to the free area of the duct or ducts to which they are connected.

(9) The capacity of any vertical cold air face shall be determined by multiplying the base line in inches by not to exceed fourteen inches (14") in height and deducting for the grills or cross bars.

I. Smoke Pipes

(1) The smoke pipe shall be as short and direct as consistent with the location of the furnace. It shall be made of metal not lighter than No. 24 U. S. Standard Gauge and not less than the full size of the collar on the furnace throughout its entire length. It must have no opening for attaching any fireplace, stove, range, water heater, gas or ventilating connection. It shall be lock-seamed or riveted; all joints

shall lap not less than one and one-half inches (1½") and it shall be rigidly secured. Cast iron smoke pipe may be used.

(2) All smoke pipes shall be provided with check dampers, placed on the side of the pipe or at the end of a tee; when cast iron smoke pipe dampers are used they must be placed between the check damper and the furnace and supported on both sides of the pipe.

(3) Where the smoke pipe enters the flue, a thimble shall be cemented into the flue and the connections thereto made air-tight. Should any smoke pipe come within eighteen inches (18") of any combustible material, such combustible material must be covered with asbestos paper and a metal shield so fastened that a two-inch (2") air space exists between this shield and the combustible material. This shield shall be no less in size than twice the diameter of the smoke pipe and of sufficient length to cover the combustible material at all points.

(4) No smoke pipe shall project through any external wall or window.

J. Pipeless or One Pipe Furnaces

(1) When but one duplex grating is used for both warm air and cold air in a so-called pipeless furnace, the area of the cold air intake shall be at least equal to the area of the warm air outlet of the grating. Section 5, D, relative to casing shall not govern when this type of furnace is installed, but the following specification shall be followed: The inner and outer casing of this type of furnace may be made of either black or galvanized iron not lighter than No. 26 U. S. Standard Gauge. A uniform air space shall be maintained at all points between the inner and outer casing. In no case shall the top of the heater be allowed closer than twelve inches (12") to any ceiling or joists above the furnace.

(2) Where joists are cut to accommodate this furnace, headers shall be put in and braced.

(3) Section Four, for determining area of warm air pipe, shall not

govern in figuring a pipeless furnace.

(4) Where one warm air register face is used and separate face or faces for cold air supply are used, then Section No. 5, E, G and H, shall apply.

K. Permit

(1) It shall be unlawful for any person, persons, firm or corporation to construct, replace or install any warm air heating furnaces or appurtenances thereto within the city of Chicago without first obtaining from the Commissioner of Buildings a permit to do such work, for which said person, persons, firm or corporation shall pay to said Commissioner of Buildings for the use of said city, for each furnace installed, renewed or repaired, the sum of five dollars (\$5.00).

(2) No heating permits shall be required for minor repair work. By minor repair work is meant the incidental repairs to furnaces which shall not affect the general action of the system, such as renewal of grates, smoke pipes and resetting old furnaces in same location, or renewing of single warm air pipes in basement; but when additional runs or new stacks are installed, a permit shall be required, for which the person, firm or corporation installing said additional runs or new stacks shall pay to the Commissioner of Buildings, for the use of said city, the sum of one dollar (\$1.00) for each outlet.

L. Inspection

(1) It shall be the duty of the Commissioner of Buildings to cause an inspection to be made of all warm air furnaces and the appurtenances thereto hereafter installed by an inspector who is an experienced and competent journeyman sheet metal worker, and see that same is installed or constructed in conformity to the provisions of this ordinance. The expenses of such inspection shall be paid out of the fees received for permits to install or construct such warm air furnaces and appurtenances.

(2) Inspection of new work shall be made as follows: When such work has proceeded to where

the stacks to upper floors and heads for all side wall registers have been installed, boots connected thereto, and the lining of all cold air return ducts, the contractor or person obtaining permit for this work shall notify the Commissioner of Buildings, who shall make or cause to be made an inspection of such work. Upon finding that the work complies in all respects with the terms of this ordinance, there shall be affixed by said Commissioner of Buildings, or his representative, to each register head and linings of all cold air return ducts, a certificate stating that the work complies with the ordinance relating thereto.

(3) Final inspection of plant shall be made after the whole is connected up and ready to operate, but before any fire has been started.

(4) It shall be unlawful for any person to lath over, plaster or cover up any warm air heating work before such work has been inspected and certificates above referred to have been attached. The Commissioner of Buildings shall have the right and authority to remove or order removed all such lath, plaster or other coverings which may have been placed over such work before same has been inspected. The person, persons, firm or corporation ordering or causing such work to be covered up, or in any way violating any section of this ordinance as herein set forth, shall, upon conviction, be subject to the penalties set forth for violation of the terms of this chapter.

Section Six—Registration

It shall be unlawful for any person, firm or corporation to engage in the business of installing gravity warm air heating plants with necessary appurtenances thereto as heretofore defined without being registered as a warm air furnace heating and installing contractor in the manner hereinafter set forth; provided, however, that if such person, firm or corporation is already registered for the current year in another city or village within the State of Illinois, such contractor shall not be required to be registered or to pay registration fee in this city.

Section Seven—Application for Registration

Any person, firm or corporation desiring to engage in the business of warm air furnace heating and installing contractor shall apply for registration to the Commissioner of Buildings. Upon the filing of such application in proper form and the payment of registration fee fixed herein, the Commissioner of Buildings shall register the applicant as a warm air furnace heating and installing contractor and shall issue to the applicant a certificate of registration which will authorize the applicant to engage in such business for the year in which it is issued; providing, that such applicant has filed with the City Collector an indemnifying bond as hereinafter set forth. The Commissioner of Buildings shall keep a suitable record of such registration.

Section Eight—Bond

Prior to the issuance of a certificate of registration for warm air furnace heating and installing contractor, the applicant shall file with the City Collector of the City of Chicago an indemnifying bond with good and sufficient sureties in the penal sum of two thousand dollars (\$2,000.00), such bond being payable to the Commissioner of Buildings of the City of Chicago, for the use of any persons, firms or corporations with whom such applicant shall thereafter contract to do work, to indemnify any such persons, firms or corporations for damages sustained on account of the failure of such applicant to perform the work so contracted for, in accordance with the provisions and requirements of the City of Chicago relating to the installation of gravity warm air heating plants with necessary appurtenances thereto.

Section Nine—Fee for Registration—Term

The fee for registration as a warm air furnace heating and installing contractor shall be fifty dollars (\$50.00) per annum, which shall be paid by the applicant to the City Collector in advance upon filing his application. The certificate

of registration issued thereunder shall expire on the 31st day of December of the year in which it is issued.

Section Ten—Validity

Should any section or provision of this ordinance be held unconstitutional or invalid by any court, all other sections and provisions shall, nevertheless, be deemed as effective as though such unconstitutional or invalid section or provisions had never been inserted in this ordinance.

Section Eleven

All ordinances, or parts of ordinances, inconsistent with the provisions of this ordinance are hereby repealed.

Section Twelve—Penalty

Any person, firm or corporation that shall engage in the business of a warm air heating and installing contractor without obtaining a certificate of registration as herein provided for, or that shall violate any of the provisions of this ordinance, shall be fined not less than fifty dollars (\$50.00) nor more than two hundred dollars (\$200.00) for each offense, and a separate and distinct offense shall be regarded as committed every day on which such person, firm or corporation shall continue to operate contrary to the provisions of this ordinance.

Section Thirteen

This ordinance, including the provisions and penalty therein set forth, shall take effect and be in force from and after its passage and due publication.

Passed

.....

Attest:

....., Mayor.

....., City Clerk.

(Seal)

This ordinance is approved and recommended by the Greater Chicago Warm Air Heating Association, an organization devoted to the upbuilding of warm air heating.

ORDINANCE COMMITTEE.

Richardson & Boynton Company Buys Utica Heater Company

Boiler Division Not Included in the Transfer—Personnel to Remain the Same

PURCHASE of the Utica Heater Company, Utica, New York, by the Richardson & Boynton Company, New York City, has been effected, according to a statement by D. Rait Richardson, President of the Richardson & Boynton Company. The company will continue to manufacture not only the "Perfect" line of heating and cooking apparatus, but will also manufacture the Utica furnaces—"Superior," "Super Smokeless" and "Essex." The manufacture of Utica boilers, now carried on at the Utica plant, will be transferred to other plants of the National Radiator Company, as this particular part of the Utica Company's business was not embraced in the sale to the Richardson & Boynton Company. The operating personnel and management will remain the same.

Purchase of the Utica Heater Company by the Richardson & Boynton Company of New York has been effected according to D. Rait Richardson of the latter company.

The Utica Heater Company was a division of the National Radiator Corporation. Its plant covers approximately 23 acres at Whitesboro, on the outskirts of Utica, N. Y. It is generally regarded as one of the most modern and well adapted industrial organizations in the field. Its transfer to the Richardson & Boynton Company means that the latter will add to its already complete line of cooking and heating apparatus, another equally well distributed line of warm air furnaces that will supplement the Richardson product.

In shaping plans for future distribution the president of the company, D. Rait Richardson, claims that his dealers will welcome the change. It will give them a broader line with which to meet competition and enable them to better satisfy the

varying requirements of individual customers.

The consolidation will work to the immediate advantage of the trade through the greatly increased facilities in all directions. The combined staff of field men now comprises one of the finest bodies of heating specialists in the industry. Through these men the experience and ideas of the two big companies will be interchanged for the benefit of the individual dealer.

In offering the combined lines, the Richardson & Boynton Company announces that its policy of protection to the trade will be strictly adhered to. The company has always enjoyed the utmost faith of its dealers because of its refusal to sell direct, through the mail or in any other way that would work against the legitimate profits of the installer.

Another advantage to the trade resulting from the consolidation is the greatly increased warehouse system for distribution. A network of warehouses at all strategic centers will insure quick delivery to any point. All types of equipment manufactured by both companies will be kept on hand in sufficient quantities for any call.

The history of the Richardson & Boynton Company reads like a business romance. Like all such romances, it starts with the story of a man who believed that success could be won only through the creation of true service. This man was Henry A. Richardson. It is safe to say that the remarkable position enjoyed by the Richardson & Boynton Company today is largely the result of this spirit of service. It has been said that no other company enjoys a stronger friendship on the part of its dealers than does the Richardson & Boynton Company. Its policy has always been to stand behind its dealers, work in their interest and labor for their success. In spite of

the company's growth it has always maintained a close contact with these dealers and the acquisition of the Utica company will not in any way alter this policy, which has been one of the guiding principles of the business since its inception in 1837. It was in that year that Henry A. Richardson established a small stove industry in West Boylston, Mass., buying goods according to his own patterns from several nearby foundries. Probably he did not foresee the tremendous growth the business would enjoy, but what he did conceive was that if he dealt fairly, improved his product constantly and gave a dollar's worth of stove for a dollar in cash the business was bound to grow and make friends.

The idea is not a new one. Other men in other lines of business have known that if followed faithfully they are certain to bring success. Henry A. Richardson went a step further than the mere knowledge of these facts. He applied them.

In 1840 Mr. Richardson moved his business to Worcester, Mass., and entered the field of wholesaling stoves and furnaces. In 1847 there was another move, this time to Boston as the "Richardson" reputation for excellence and fair dealing had spread throughout New England. Soon the character and integrity of this business of cooking and heating apparatus became known in other parts of the United States and it was not long before the demand for the company's product necessitated the opening of an office in New York.

This was in 1852, when the company was manufacturing not only in New England but also in Spuyten Duyvil in order to have a source of supply nearer the New York market. In 1858 the firm began to manufacture at Norwalk, Conn., in addition to the other plants and in 1865 the name of Richardson & Boynton Company was established and the company was incorporated in 1882. In the meantime they had started manufacturing at Van Brunt Street, Brooklyn, where they were making steam and water boilers. So successful had the company's busi-

ness become that in 1898 the Brooklyn plant was abandoned for a larger and more modern factory at Dover, N. J.

Mr. D. Rait Richardson has devoted his life and energy to the development of the company's business and under his regime it has expanded with remarkable strides. It is a tribute to his democratic ideas that he started his business life in the company's foundry and progressed from place to place only after he had fully mastered the "overall jobs." His election to the presidency came in 1918 after he had held several high executive

positions in the company. He is one of the most widely known men in the heating industry and deeply concerned in its welfare. His work in the Association is well known.

In 1917 he served as president of the National Warm Air Heating and Ventilating Association and has been an active and interested member ever since. He is also a member of the National Boiler and Radiator Manufacturers' Association and likewise of the American Society of Heating and Ventilating Engineers.

Mr. Richardson is a firm believer in personal and friendly contact in

business, and it is his boast that his company stands closer to its dealers and the trade than is generally thought possible in the case of any large modern corporation. In selecting the Utica section for the location of his warm air furnace plant Mr. Richardson has indicated his faith in the future of that growing manufacturing center.

The present executive headquarters of the company are at 260 Fifth Avenue, New York City. Sales offices are maintained in New York, Utica, Boston, Chicago, Philadelphia, Buffalo, Newark, Cincinnati and Minneapolis.

What Is a Furnace Dealer?

By JOHN S. WALKER, President National Heat Craft Institute

WHAT is a furnace dealer? Is there a definite group in your community that manufacturers' salesmen recognize as dealers? If these salesmen fail to sell this group, are they going out and selling your building contractors direct?

Many of the manufacturers are playing absolutely fair in this respect, but there is a growing tendency among factory salesmen to take this method where they have been unable to get a dealer. Some of them sell anybody and everybody, others "appoint a building contractor as agent." Still others try to conceal their operations by getting some merchant (who is not in the business and never intends to be) to lend his name to the transaction. The sign tacked on the house reads, "A Blank Furnace will be installed by Bill Jones." As a matter of fact, Bill Jones did not sell the job, estimate the cost, order the pipes and fittings, nor supervise the installation.

One salesman who is carrying on these operations was raising Cain recently about a wholesale plumbing house that is selling fixtures direct to contractors. He said that all the plumbers in town were going to boycott all manufacturers that sold goods to this wholesaler. Of course, his own company (which sells both

furnaces and boilers) is going to "play fair" with the plumbers and not sell this wholesaler.

This looks to a lot of furnace dealers like a double standard of doing business. If there are recognized plumbers, there should be recognized furnace dealers.

Another group that is storming the country is the "manufacturer's agent." His office is often a corner in the family writing desk. He has a lot of stationery printed, "John Jones—Manufacturer's Agent." Whenever he wants anything from a shotgun to a new firepot for his furnace, he gets it wholesale. What per cent of the furnaces today are sold through manufacturers' agents? About one-half of 1 per cent. Then why should furnaces and repairs be sold to everyone that calls himself a manufacturer's agent?

Any action taken to clean up conditions would come most gracefully from the manufacturers themselves. Some of them state in their ads that they do not sell through direct factory branches. Dealers would appreciate having this changed to read, "Furnaces and repairs sold only to recognized furnace dealers." Their catalogues might contain their code of ethics. It could replace a picture of the factory.

If the salesman had this same

slogan printed at the bottom of his card, the dealer would know when he was talking to a friend and he would be received as such.

What Causes Down Draft When No Buildings Are Near Chimney?

The Harry R. Freedman Company, 116 East Third Street, Cincinnati, Ohio, asks for a little assistance with a bothersome chimney. They write as follows:

"We have had considerable trouble with a flue for one of our customers and would appreciate very much if you can get some remedy to eliminate a down draft.

"The chimney on this house is approximately 15 feet in height and extends about three feet above the highest point of the ridge on the roof. The house is situated on a corner lot and the chimney faces the open, the nearest building on that side being about 300 feet away, with another at 40 ft.

"During severe winds a down draft is caused, which makes the furnace smoke. We have already tried putting a hood over the chimney, but this does not help.

"Can you offer a remedy to this difficulty, or can you offer some kind of a hood that will correct the defect?

**The Fox Furnace Company
Announces a New Line
of Sunbeam Furnaces**

An indication of the great strides forward being made by the warm air heating industry is found in the recent announcement of a new and improved line of Sunbeam furnaces



The Furnace

by The Fox Furnace Company, of Elyria, Ohio.

The progressive spirit of furnace manufacturers, as evidenced by marked improvements in heating plant design and construction, in combination with the spreading knowledge of the Standard Code and its beneficial effect on installation methods and practices, augurs well for the future success of those who are most vitally concerned with the ultimate prosperity of warm air heating.

Cleaner heating is one of the major claims advanced for the New



The Furnace Cased

Sunbeam warm air furnaces, which will be known as the 1,000 Series. It is based on the elimination of more than twenty (20) linear feet of joints in the warm air chamber. Radiator, smoke collar and cleanout are cast in one piece. Both feed section and ash pit openings extend outside of the front of the furnace. No longer can gas or dust from these parts escape into the warm air runs and arouse the antagonism of housewives.

One improvement is the heavier castings and the fact that the heating unit is perfectly centered. From the strong, one-piece base which insures a firm, level setting for the furnace, to the newly-designed one-piece radiator, the new "1,000 Series" Sunbeam furnace is built for many years of service.

Dealers and home owners have a choice of two grates, both operated by an upright shaking lever, which has a unique locking device to keep the grates in the proper position. Boiler, or rocking, grates—flat, or dumping, grates—whichever happen to be preferred, are available. Simplicity of assembly and ease of installation and removal are incorporated in both of these types. There are no bolts; only a single cotter pin to be inserted or removed.



Kentucky Hardware & Implement Association, Seelbach Hotel, Louisville, Kentucky, January 17 to 20, 1927. Secretary-treasurer, J. M. Stone, 200 Republic Building, Louisville, Kentucky.

Missouri Retail Hardware Association, the Hotel Statler, St. Louis, January 23-25. F. X. Becherer, secretary, 5106 North Broadway, St. Louis.

American Society of Heating and Ventilating Engineers, Hotel Pennsylvania, New York City, January 23 to 26, 1928. Secretary A. V. Hutchinson, 29 West 39th Street, New York City.

Sheet Metal Contractors' Association of Indiana, January 24, 25 and 26, 1928, at Indianapolis, Indiana. Executive secretary, Paul R. Jordan, 631 South Delaware Street, Indianapolis.

Indiana Warm Air Heating and Ventilating Association, January 24, 25 and 26, 1928, Indianapolis. Secretary Frank E. Anderson, 2242 Liberty avenue, Terre Haute, Indiana.

Indiana Fur. Mets, January 24, 25 and 26, 1928, Indianapolis. Secretary Harry R. Jones, 308 Kenmore Road, Indianapolis.

Nebraska Retail Hardware Association, Omaha, January 31 to February 3. George H. Dietz, secretary, 414-19 Little Building, Lincoln.

Indiana Retail Hardware Association, Indianapolis, January 31 to February 3. The Claypool Hotel will be convention headquarters and meeting place. G. F. Sheely, secretary, 911 Meyer-Kiser Bank Building, Indianapolis.

Master Sheet Metal Contractors' Association of Wisconsin, Republican Hotel, Milwaukee, Wisconsin, February 6 and 7, 1928. L. F. Reinke, 514 Market Street, Milwaukee, Wisconsin, secretary.

Michigan Retail Hardware Association, Detroit, February 7-10. The Statler Hotel will be headquarters. A. J. Scott, secretary, Marine City.

Wisconsin Retail Hardware Association, Auditorium, Milwaukee, February 7-10. P. J. Jacobs, secretary, Stevens Point.

Iowa Retail Hardware Association, Des Moines, February 14-17. A. R. Sale, secretary, Mason City.

Illinois Retail Hardware Association, February 14, 15 and 16, at the Sherman Hotel, Chicago. Leon D. Nish, secretary, 14-16 North Spring Street, Elgin.

Pennsylvania and Atlantic Seaboard Hardware Association, Philadelphia Commercial Museum, February 14-17. Sharon E. Jones, secretary, Wesley Building, Philadelphia.

Carolinas-Virginia Sheet Metal Contractors' Association, Charlotte, North Carolina, February 15 and 16. Secretary George I. Ray, Charlotte, North Carolina. Convention headquarters at Chamber of Commerce. Convention will be held in Hotel Charlotte.

Minnesota Retail Hardware Association, New Municipal Auditorium, Minneapolis, February 21-24. C. H. Casey, manager, Nicollet at 24th Street, Minneapolis.

Ohio Hardware Association will hold its 1928 convention and exhibit at Toledo, February 21-24. James B. Carson, secretary, 411 Mutual Home Building, Dayton.

South Dakota Retail Hardware Association, Coliseum Building, in Sioux Falls, February 27, 28, 29, 1928. Charles H. Casey, Secretary, Nicollet at 24th Streets, Minneapolis.

Michigan Sheet Metal & Roofing Contractors' Association, Kalamazoo, Michigan, March 5, 6, 7, 8, 1928. Secretary, Frank E. Ederle, 1121 Franklin Street, Grand Rapids, Michigan.

Arkansas Retail Hardware Association, Little Rock, during the month of May, exact dates for the meeting to be determined later. L. P. Biggs, secretary, 815-16 Southern Trust Building, Little Rock.

National Association of Sheet Metal Contractors of the United States, the Ohio Sheet Metal Contractors' Association, joint convention, Hotel Statler, Cleveland, Ohio, May 22, 23, 24 and 25, 1928. J. M. Saunders, 215 Plymouth Building, Cleveland, Ohio, convention chairman.



“Have Used TONCAN Iron for Some Time —Would Use No Other”

WRITES Edward F. Penney, New Bedford, Mass. Mr. Penney is just one of thousands of sheet metal contractors who are staunch in their opinions that Toncan Copper Molybdenum Iron is the best metal to recommend and install to make the greatest profits.

Toncan Iron advertising in The Saturday Evening Post brings greater

New Bedford, Mass.
May 17, 1927.
Central Alloy Steel Corp.,
Massillon, Ohio.

Gentlemen:
Have used Toncan Iron for some time, will use no other. It is soft and very easy to handle. If the seam is not right you can turn it back and turn again, and in forming furnace pipe you can form it just as you want to, where steel will spring out of place.

Edward F. Penney,
Sheet Metal Contractor.

prestige to the sheet metal contractor who specifies it. His customers place more reliance in his workmanship when they learn that he uses Toncan Iron.

If you are not now using Toncan Iron, let us tell you how you can increase your sales and profits. Write today for our new booklet, "Speeding Up Sheet Metal Profits."



Toncan is Used for

Roofing, Siding, Cornices, Metal Lath, Window Frames, Culverts, Ventilators.

CENTRAL ALLOY STEEL CORPORATION Massillon, Ohio

Cleveland	Makers of Agathon Alloy Steels	St. Louis
Syracuse	Detroit	Seattle
San Francisco	Philadelphia	Tulsa

Toncan is Used for

Furnaces, Gutters, Spouting, Flashing, Ranges, Refrigerators, Tables.

WORLD'S LARGEST AND MOST HIGHLY SPECIALIZED ALLOY STEEL PRODUCERS

Demand in Iron and Steel Market Increases—Seven Stocks Added in One Week

Inquiry for Pig Iron Is Fair—Little Change in Nonferrous Prices

EVEN discounting the improvement normally occurring in January and the fact that neither demand nor production slumped appreciably over the holidays, the insistence of consumers for tonnage is inspiring. The late December rate of activity has carried over into January on a higher plane.

It has been over two years since so many as seven stacks have been put on the active list in one week, and January promises to be the first month since last March to develop a gain in pig iron production. Five of the lighted stacks are steelworks ones and two merchant, faithfully portraying the greater interest in steel than in merchant iron.

Prompted by heavy railroad buying of rolling stock and specifying of track material and the gradual comeback in the automotive industry, the Pittsburgh and Chicago districts are relatively more active than the eastern ones. For the first time in many months some makers of light products, such as strip, are accumulating backlog. Steel making the country over now averages close to 75 per cent, with Steel Corporation subsidiaries having moved up to 77 per cent.

Pig Iron

The market for basic iron has been clarified for the first time in many weeks by the sale of 1,000 tons by a valley merchant producer to a consumer in the valley, with a short freight rate, at \$17, valley.

Consumers of foundry iron are becoming more active and specifications are increasing. A few new purchases noted in the past week involve up to 200 or 300 tons at a time at \$17.25, base, valley. Some makers are selling single carloads of higher silicon iron at differentials of 25 cents, instead of the usual 50 cents. One or two interests quoting \$17.50, base, valley, are not selling.

It is reported that 1,500 tons of malleable Bessemer was sold at \$17.25, valley, by a valley steel works to a consumer in that district, but details are lacking here.

Reports compiled show the average sales price of Bessemer iron in December was \$17.565, a decrease of 21 cents from November. The average for basic iron in December was \$17, the same as in November and October.

Inquiry for northern pig iron at Chicago continues active. Estimates are that slightly more than half the first quarter tonnage has been placed. Several important tonnages have just been closed. Shipments are being resumed at approximately the high rate of December. The base price of foundry and malleable is reported firm at \$18.50, Chicago furnace.

At Birmingham the first quarter production of foundry iron, at the present rate of output, will be sold easily. The base price continues \$16, Birmingham.

Copper

Copper sold at 14 cents to 14.12½ cents, Connecticut, in the past week, mostly at the latter figure, and the market became strong. Export business again was big, at 14.50 cents c.i.f. European ports, unchanged, while prices in the open market abroad went up. Business also was done at 14.25 cents, Midwest. Domestic business was scattered through the first quarter, mostly February shipment, while export business was more evenly divided among the first three months.

Tin

The fall in tin prices appeared to originate in London and exceeded the expectations of the market here. Moreover, the market abroad was slow to respond to the larger buying here. At the same time Singapore sold freely on the dropping market,

but there was the extraordinary spectacle of the Eastern price, or futures, becoming higher than London spot as the latter went down the more rapidly.

As a result, spot and futures went to one price here, whereas for a number of years there has been a premium on spot, varying from several cents last winter to a small fraction of a cent in recent months.

Zinc

Prime western zinc was unusually steady at 5.65 cents, East St. Louis, with a premium of 2½ points for several months ahead. Buying remained light and the market was featureless. Toward the end of the week smelters appeared a little firmer in expectation of a stronger ore market.

Lead

Some lead business was done early in the week, but later the market became very quiet and with slight easiness on the East St. Louis basis. Some metal appeared at 6.30 cents or 2½ points less than that at which most business had been done. The London price eased a bit first, however.

Solder

Chicago warehouse prices on solder are as follows: Warranted 50-50, \$36.50; Commercial 45-55, \$33.50; plumbers', \$30.50; all per 100 pounds.

Old Metals

Wholesale quotations in the Chicago district, which should be considered as nominal, are as follows: Old steel axles, \$15.00 to \$15.50; old iron axles, \$10.00 to \$10.50; steel springs, \$14.75 to \$15.25; No. 1 wrought iron, \$10.50 to \$11.00; No. 1 cast, \$12.75 to \$13.25, all per net tons. Prices for non-ferrous metals are quoted as follows, per pound: Light copper, 9 cents; zinc, 3½ cents; cast aluminum, 13¾ cents.

Another RECORD on its way to be broken

WHEN the final advertising forms closed for the 34th Warm Air Furnace Annual of AMERICAN ARTISAN issued on December 31st, 1927, a new record was made.

This special number which is destined to live and bear fruit for both its readers and advertisers for many months to come carried a *larger volume* and *greater number* of warm air furnace and supply advertisers than that ever carried by any other publication.

A significant fact in regard to this record breaking issue is that practically all of the advertisers are consistent

users of advertising space in AMERICAN ARTISAN throughout the year.

Another fact that is significant of the business outlook for 1928 is that more of these advertisers used *larger space* than ever before.

And this record is on its way to be broken — advertising contracts starting with the new year are for *more space*, showing that the warm air heating industry is keeping step with the other industries in following a more vigorous publicity policy for 1928 business.

1928 will reward consistent advertisers.

Chicago Warehouse Metal and Furnace Supply Prices

AMERICAN ARTISAN is the only publication containing Western Metal, Furnace Supply and Hardware prices corrected weekly.

METALS

PIG IRON

Chicago Fdy.	\$18.50
No. 2	22.01
Southern Fdy. No. 2	22.01
Lake Superior Charcoal	27.04

Malleable

FIRST QUALITY BRIGHT TIN PLATES

1C	20x28 112 sheets	\$25.10
IX	20x28	29.60
IXX	20x28 56 sheets	16.20
IXXX	20x28	17.55
XXXX	20x28	18.95

TERNE PLATES

	Per Box	
IC	20x28, 40-lb.	112 sheets \$26.00
IX	20x28, 40-lb.	112 sheets \$35.50
IC	20x28, 25-lb.	112 sheets \$31.75
IX	20x28, 25-lb.	112 sheets \$34.25
IC	20x28, 20-lb.	112 sheets \$26.00
IV	20x28, 20-lb.	112 sheets \$22.50
IC	20x28, 16-lb.	112 sheets \$18.50

"ARMCO" INGOT IRON PLATES

No. 8 ga. up to and including

1/4 in.—100 lbs. \$4.55

COKE PLATES

Cokes, 80 lbs., base, 20x28.	\$13.60
Cokes, 90 lbs., base, 20x28.	13.80
Cokes, 100 lbs., base, 20x28.	14.00
Cokes, 107 lbs., base, IC 20x28	14.30
Cokes, 135 lbs., base, IX 20x28	16.40

BLUE ANNEALED SHEETS

Base 10 ga.—per 100 lbs. \$2.50
"Armco" 10 ga.—per 100 lbs. 4.00

ONE PASS COLD ROLLED BLACK

No. 18-20	per 100 lbs.	\$2.75
No. 32	per 100 lbs.	3.90
No. 24	per 100 lbs.	2.95
No. 26	per 100 lbs.	4.05
No. 27	per 100 lbs.	4.10
No. 28	per 100 lbs.	4.20
No. 29	per 100 lbs.	4.35
No. 30	per 100 lbs.	4.45

"ARMCO" GALVANIZED

"Armco" 24.—per 100 lbs. \$6.15

GALVANIZED

No. 16	per 100 lbs.	\$4.30
No. 18	per 100 lbs.	4.45
No. 20	per 100 lbs.	4.60
No. 22	per 100 lbs.	4.65
No. 24	per 100 lbs.	4.80
No. 26	per 100 lbs.	5.05
No. 27	per 100 lbs.	5.15
No. 28	per 100 lbs.	5.20
No. 30	per 100 lbs.	5.70

BAR SOLDER

Warranted 50-50 per 100 lbs. \$36.50

Commercial 45-55 per 100 lbs. 22.50

Plumbers per 100 lbs. 30.50

ZINC

In Slabs \$8.50

SHEET ZINC

Cash Lots (800 lbs.) \$12.00

Sheet Lots 18.00

BRASS

Sheets, Chicago base 17 1/2 c

Mill base 18 1/2 c

Tubing, brazed base 26 1/2 c

Wire, base 18 1/2 c

Rods, base 19 1/2 c

COPPER

Sheets, Chicago base 22 1/2 c

Mill Base 21 1/2 c

Tubing, seamless base 28 1/2 c

Wire, No. 9, B & S Ga. 18 1/2 c

Wire, No. 10, B & S Ga. 19 1/2 c

Wire, No. 8, B & S Ga. and heavier 18 1/2 c

LEAD

American Pig	\$7.25
Bar	8.25

TIN

Pig Tin	per 100 lbs. \$65.50
Bar Tin	per 100 lbs. 66.50

14 inch, doz. \$6.00

12 inch, doz. \$5.50

10 inch, doz. \$5.00

8 inch, doz. \$4.20

7 inch, doz. \$3.20

5 inch, doz. \$2.20

3 inch, doz. \$1.20

1 inch, doz. 50¢

1/2 inch, doz. 25¢

1/4 inch, doz. 12.5¢

1/8 inch, doz. 6.25¢

1/16 inch, doz. 3.125¢

1/32 inch, doz. 1.5625¢

1/64 inch, doz. 0.78125¢

1/128 inch, doz. 0.390625¢

1/256 inch, doz. 0.1953125¢

1/512 inch, doz. 0.09765625¢

1/1024 inch, doz. 0.048828125¢

1/2048 inch, doz. 0.0244140625¢

1/4096 inch, doz. 0.01220703125¢

1/8192 inch, doz. 0.006103515625¢

1/16384 inch, doz. 0.0030517578125¢

1/32768 inch, doz. 0.00152587890625¢

1/65536 inch, doz. 0.000762939453125¢

1/131072 inch, doz. 0.0003814697265625¢

1/262144 inch, doz. 0.00019073486328125¢

1/524288 inch, doz. 0.000095367431640625¢

1/1048576 inch, doz. 0.0000476837158203125¢

1/2097152 inch, doz. 0.00002384185791015625¢

1/4194304 inch, doz. 0.000012320928955078125¢

1/8388608 inch, doz. 0.0000061604644775390625¢

1/16777216 inch, doz. 0.00000308023223876953125¢

1/33554432 inch, doz. 0.000001540116119384765625¢

1/67108864 inch, doz. 0.0000007700580596923828125¢

1/134217728 inch, doz. 0.00000038502902984619140625¢

1/268435456 inch, doz. 0.00000019251451492309571875¢

1/536870912 inch, doz. 0.000000096257257461547859375¢

1/107374184 inch, doz. 0.0000000481286287307739296875¢

1/214748368 inch, doz. 0.00000002406431436538696484375¢

1/429496736 inch, doz. 0.000000012032157182693482421875¢

1/858993472 inch, doz. 0.0000000060160785913467412109375¢

1/1717986944 inch, doz. 0.00000000300803929567337060521875¢

1/3435973888 inch, doz. 0.000000001504019647836685302609375¢

1/6871947776 inch, doz. 0.0000000007520098239183426513046875¢

1/1374389552 inch, doz. 0.00000000037600491195917132520234375¢

1/2748779104 inch, doz. 0.000000000188002455979585662601171875¢

1/5497558208 inch, doz. 0.0000000000940012279897928331008589375¢

1/10995116416 inch, doz. 0.0000000000470006139948964165004291875¢

1/21990232832 inch, doz. 0.0000000000235000319747482082502189375¢

1/43980465664 inch, doz. 0.000000000011750015987374104125109875¢

1/87960931328 inch, doz. 0.0000000000058750079436870520625549375¢

1/175921862656 inch, doz. 0.0000000000029375039218435260312749375¢

1/351843725312 inch, doz. 0.00000000000146875196092176301563749375¢

1/703687450624 inch, doz. 0.000000000000734375980460881507818749375¢

1/140737490128 inch, doz. 0.000000000000367187490230440753909375¢

1/281474980256 inch, doz. 0.0000000000001835937451502203794546875¢

1/562949960512 inch, doz. 0.0000000000000917937475751101897291875¢

1/112589992104 inch, doz. 0.0000000000000458937487875550948646875¢

1/225179984208 inch, doz. 0.000000000000022946874938777547434375¢

1/450359968416 inch, doz. 0.000000000000011473749469388723718749375¢

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1/1801439873664 inch, doz. 0.0000000000000028684374373472059291875¢

1/3602879747328 inch, doz. 0.0000000000000014344374186736029646875¢

1/7205759494656 inch, doz. 0.0000000000000007172187403388014821875¢

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1/11529279191296 inch, doz. 0.0000000000000000448261712711803046875¢

1/23058558382592 inch, doz. 0.0000000000000000224130856355901721875¢

1/46117116765184 inch, doz. 0.00000000000000001120654281779508609375¢

1/92234233530368 inch, doz. 0.00000000000000000560327140889754309375¢

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1/36893693532352 inch, doz. 0.00000000000000000140081785222438609375¢

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1/14757477412944 inch, doz. 0.00000000000000000035020446305609646875¢

1/29514954825888 inch, doz. 0.00000000000000000017510223152804821875¢

1/59029859651776 inch, do



**Doubly Durable
Because
Doubly Protected**

1 The base metal is the highly rust-resistant Copper Alloy, known everywhere as Ohio Metal.

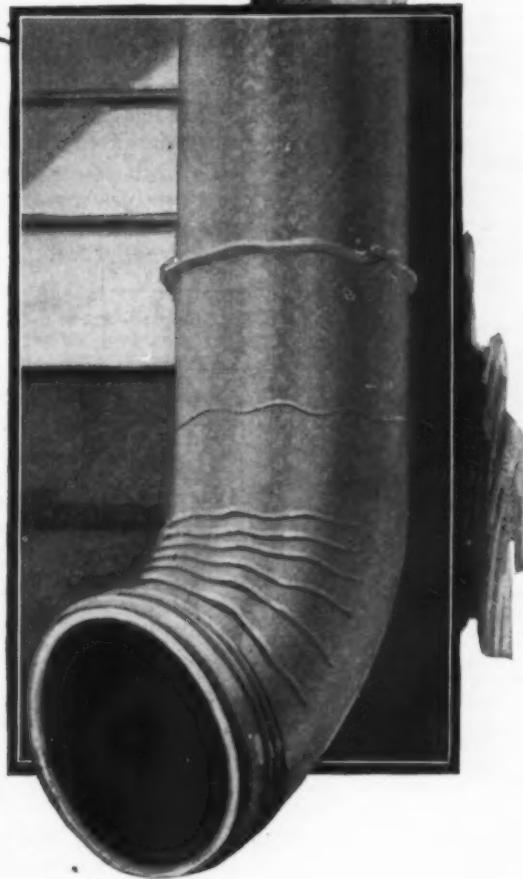
2 The conductor is completely formed and finally hand-dipped in pure molten zinc.

A SAMPLE of Wheeling Hand-Dipped Conductor will enable you to judge why the trade, generally, accepts it as the most satisfactory and the most economical conductor made.

Note that the metal base is completely imbedded in a thick, impenetrable protective coating of pure zinc. Note also that the seams, edges and surfaces are thoroughly and uniformly covered—the result of *hand-dipping after forming*.

Exposed to the air, the zinc first protects itself by a natural surface oxidization. This ceases abruptly after closing the pores of the zinc and a lasting barrier to the elements is the result.

Made of Ohio Metal, hand-dipped in pure molten zinc, this conductor is stronger, more rigid and doubly durable. Let us send you a sample for close-up inspection.



Wheeling HAND DIPPED CONDUCTOR

Wheeling Corrugating Company, Wheeling, W. Va.

NEW YORK
ST. LOUIS

PHILADELPHIA
RICHMOND

CHICAGO
CHATTANOOGA

KANSAS CITY
MINNEAPOLIS

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NETTING, POULTRY

Galvanized before weaving. 57 1/2-5 1/2%
Galvanized after weaving. 52 1/2-6 1/2%

PASTE

Asbestos Dry Paste:
200-lb. barrel. \$16.00
100-lb. barrel. 8.75
35-lb. pail. 8.50
10-lb. bag. 1.10
5-lb. bag. 6.00
2 1/2-lb. cartons.35

PIPE

Conductor Cor. Rd., Plain Rd., or Sq.

Galvanized
Crated and nested (all gauges) 75-8 1/4%
Crated and not nested (all gauges) 70-15%

Furnace Pipe

Double Wall Pipe and Fittings. 60%
Single Wall Pipe, Round Galvanized Pipe. 60%
Galvanized and Tin Fittings. 60%

Lead

Per 100 lbs. \$12.50

Stove Pipe

"Milcor" "Titelock" Uniform Blue Stove
28 gauge, 5 inch U. C. 10.50
28 gauge, 6 inch U. C. 11.00
28 gauge, 7 inch U. C. 12.00
30 gauge, 5 inch U. C. 9.00
30 gauge, 6 inch U. C. 10.00
30 gauge, 7 inch U. C. 12.00

T-Joint Made up

6-inch, 28 ga. per doz. \$4.00

All Zinc

No. 11, all styles. 60%

POKERS, STOVE

W'r't Steel, str't or bent. per doz. \$0.75

Nickel Plated, coll handles. per doz. 1.10

POKERS, FURNACE

Each. \$0.50

PULLEYS

Furnace Tackle. per doz. \$0.50

Furnace Screw (enameled). per doz. .75

Ventilating Register

Per gross. 3.00

Small, per pair. 2.00

Large, per pair. 5.00

PUTTY

Commercial Putty, 100-lb. Kits. \$3.40

QUADRANTS

Malleable Iron Damper. 10%

REDUCERS—Oval Stove Pipe

Per Doz. 7-6, 28-gauge, 1 doz. in

carton. \$2.00

REGISTERS AND BORDERS

Baseboard, Floor and Wall.

Cast Iron. 20%

Steel and Semi-Steel. 40-10%

Baseboard. 40-10%

Wall. 40-10%

Adjustable Ceiling Ventilators. 40-10%

Register Faces—Cast and Steel

Japanned, Bronzed and Plated, 4x6 to 14x14. 40-10%

Large Register Faces—Cast. 14x14 to 38x42. 60-10%

Large Register Faces—Steel. 14x14 to 28x42. 65-10%

RIDGE ROLL

Galv., Plain Ridge Roll, b'd'd. 75-10-5%

Galv., Plain Ridge Roll, crated. 75-10%

Globe Finials for Ridge Roll. 50%

ROOFING

Best grade, slate surf. prepared. \$3.35

Best talc surfaced. 2.65

Medium talc surfaced. 2.00

Light talc surfaced. 1.20

Red Rosin Sheet. per ton \$7.00

SCREWS

Sheet Metal. 7. 1/4x3/4, per gross. \$0.52

No. 10, 1/4x3/16, per gross.48

No. 14, 1/4x3/4, per gross.39

SHIELDS, REGISTER

Viking. \$22.00

LENNER THROATLESS

No. 18. 35%

Shear blades. 10%

(f. o. b. Marshalltown, Iowa)

SHOES

Ga. 22 Gauge, Plain or corrugated round flat crimp. 60%

26 gauge round flat crimp. 45%

24 gauge round flat crimp. 1.

SNIPS, TINNERS'

Clover Leaf. 40 & 10%

National. 40 & 10%

Star. 50%

Milcor. Net

SQUARES

Steel and Iron. Net

(Add for bluing, \$3 per doz. net.)

MITRE

Mitre. Net

TRY

Try. Net

TRY AND BEVEL

Try and Mitre. Net

TRY AND MITRE

Fox's. per doz. \$6.00

Winterbottom's. 10%

STOPPERS, FLUE

Common. per doz. \$1.10

Gem, No. 1. per doz. 1.10

Gem, flat, No. 3. per doz. 1.00

VENTILATORS

Standard. 30 to 40%

WIRE

Plain annealed wire, No. 8 per 100 lbs. \$3.05

Galvanized barb wire, per 100 lbs. 3.90

Wire Cloth—black painted, 12-mesh, per 100 sq. ft. 1.65

Cattle Wire—galvanized catch weight spool, per 100 lbs. 3.65

Galvanized Hog Wire, 80 rod spool, per spool. 3.18

Galvanized Plain Wire, No. 3, per 100 lbs. 3.40

Stove Pipe, per stone. 1.10

WRINGERS

No. 790, Guarantee. each \$5.10

No. 770, Bicycle. each 4.70

No. 670, Domestic. each 4.25

No. 110, Brighton. each 3.70

No. 750, Guarantee. each 5.10

No. 740, Bicycle. each 4.70

No. 32, Pioneer. each 3.40

No. 2, Superb. each 3.65



It carries the Load

MORE THAN sturdy enough to carry any load of snow, ice or water that can get into the gutter, the new Lupton M. R. Hanger is not only the handiest hanger on the market—it is the strongest.

STRONG LOCK

Here's the 3-way lock of security between Shank and Circle. The heavier the load on the Circle, the more rigid the connection becomes.

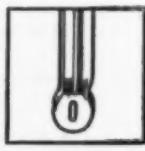


STRONG SHANK

The double channel in the bend of the shank increases the strength 50 per cent over any other type of No. 12 Shank.

STRONG CLIPS

This udylited rust-proof ribbed bead clip holds the gutter absolutely tight without solder.



WIDE BEARING

The circle of the M. R. Hanger supports the gutter on a wide bearing surface.

MORE STRENGTH

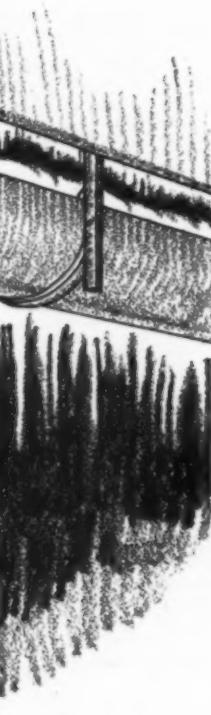
Here's strength again, near the bead, to resist any rush of ice or snow.



Check over these features and you'll use Lupton M. R. Hangers on your next eaves-trough job. Made in plain steel, udylite rust-proof coated steel and copper—sizes uniform—single and double bead circles.

Specify them to your jobber

DAVID LUPTON'S SONS COMPANY
Allegheny Ave. and Tulip St., Philadelphia



Lupton

M. R. HANGER



When writing mention AMERICAN ARTISAN—Thank you!

BUYERS' DIRECTORY

Acetylene (Gas) Dissolved. Prest-O-Lite Co., Inc., New York, N. Y.	Elbows and Shoes—Conductor. Barnes Zinc Products Co., Chicago, Ill.	Meyer Furnace Co., The, Peoria, Ill. Monitor Furnace Co., Cincinnati, Ohio	Hooks—Conductor. Berger Co., L. D., Philadelphia, Pa.
Air Filters. Reed Air Filter Co., Louisville, Ky.	Dieckmann Co., Ferdinand, Cincinnati, Ohio	Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.	Hotels. Fort Shelby Hotel, Detroit, Mich.
Bale Ties. American Steel & Wire Co., Chicago, Ill.	Lupton's Sons Co., David, Philadelphia, Pa.	Mueller Furnace Co., L. J., Milwaukee, Wis.	Humidifiers. Automatic Humidifier Co., Cedar Falls, Iowa
Blowers. Sturtevant Co., B. F., Boston, Mass.	Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City	Oakland Foundry Co., Belleville, Ill.	L. J. Mueller Furnace Co., Milwaukee, Wis.
Bolts—Stove. The Kirk-Latty Co., Cleveland, Ohio	Engineering—Fan Blast Warm Air Heating. Herbert H. Davis Co., Inc., Chicago, Ill.	Peerless Foundry Co., Indianapolis, Ind.	Robinson Furnace Co., Chicago, Ill.
Lamson & Sessions Co., Cleveland, Ohio	Wood Faces—Cold Air. Auer Register Co., Cleveland, Ohio	Premier Warm Air Heater Co., Dowagiac, Mich.	Lath—Expanding Metal. Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Ryerson & Son, Inc., Jos. T., Chicago, Ill.	American Wood Register Co., Plymouth, Ind.	Richardson & Boynton Co., New York, N. Y.	Machines—Crimping. Bertsch & Co., Cambridge City, Ind.
Brakes—Bending. Dreis & Krump Mfg. Co., Chicago, Ill.	Eaglesfield Ventilator Co., Indianapolis, Ind.	Robinson Furnace Co., Massillon, Ohio	Machinery—Culvert. Bertsch & Co., Cambridge City, Ind.
Ryerson & Son, Inc., Jos. T., Chicago, Ill.	Marsh Lumber Co., Dover, Ohio	Robinson Furnace Co., Chicago, Ill.	Machines—Tinsmith's. Bertsch & Co., Cambridge City, Ind.
Brakes—Cornice. Dreis & Krump Mfg. Co., Chicago, Ill.	McClure Builders Supply Co., East Palestine, Ohio	Rybolt Heater Co., Ashland, Ohio	Burton Co., The W. J., Detroit, Mich.
Brass and Copper. American Brass Co., Waterbury, Conn.	Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City	Schwab & Sons Co., R. J., Milwaukee, Wis.	Dreis & Krump Mfg. Co., Chicago, Ill.
Copper & Brass Research As- sociation. New York	United States Register Co., Battle Creek, Mich.	Simpflex Furnace Co., Racine, Wis.	Marshalltown Mfg. Co., Marshalltown, Iowa
Merchant & Evans Co., Philadelphia, Pa.	Fences. American Steel & Wire Co., Chicago, Ill.	Security Stove & Mfg. Co., Kansas City, Mo.	Peck, Stow & Wilcox Co., Southington, Conn.
Cans—Garbage. Osborn Co., The J. M. & L. A., Cleveland, Ohio	Fittings—Conductor. Barnes Zinc Products Co., Chicago, Ill.	Standard Furnace & Supply Co., Omaha, Neb.	Ryerson & Son, Inc., Jos. T., Chicago, Ill.
Castings—Malleable. Fanner Mfg. Co., Cleveland, Ohio	Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City	St. Louis Heating Co., St. Louis, Mo.	Unshear Co., Inc., New York, N. Y.
Ceilings—Metal. Burton Co., The W. J., Detroit, Mich.	Furnace Cement—Asbestos. Armstrong Co., The, Detroit, Mich.	Success Heater Mfg. Co., Des Moines, Iowa	Whitney Mfg. Co., W. A., Rockford, Ill.
Friedley-Voshardt Co., Chicago, Ill.	Buckeye Products Co., The, Cincinnati, Ohio	Thomas & Armstrong Co., London, Ohio	Whitney Metal Tool Co., Rockford, Ill.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City	Connors Paint Mfg. Co., Wm., Troy, N. Y.	Thatcher Co., Chicago, Ill.	Mailing Lists. R. L. Polk & Co., Detroit, Mich.
Wheeling Corrugating Co., Wheeling, W. Va.	Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City	XXth Century Heating & Ventilating Co., Akron, Ohio	Mandrels.
Chaplets. Fanner Mfg. Co., Cleveland, Ohio	Furnace Cement—Liquid. Technical Products Co., Pittsburgh, Pa.	Utica Division of Richardson & Boynton Co., Utica, N. Y.	Metals—Perforated. Harrington & King Perforating Co., Chicago, Ill.
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Vail Mfg. Co., Fort Wayne, Ind.	Sturtevant Co., B. F., Boston, Mass.	Wise Furnace Co., Akron, Ohio	Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Check Drafts. Teels Sheet Metal Co., Oshkosh, Wis.	Furnace Fans. A. H. Robinson Co., Massillon, Ohio	Gardens—Metal. Thomas & Armstrong Co., The London, Ohio	Nails—Eaves Trough. Barnes Zinc Products Co., Chicago, Ill.
Clinker Tongs. L. J. Mueller Furnace Co., Milwaukee, Wis.	Robinson Furnace Co., Chicago, Ill.	Gas (Acetylene) Dissolved. Prest-O-Lite Co., Inc., New York, N. Y.	Lupton's Sons Co., David, Philadelphia, Pa.
Coal Chutes. Majestic Co., The Huntington, Ind.	Sturtevant Co., B. F., Boston, Mass.	Gas (Nitrogen). Linde Air Products Co., New York, N. Y.	Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Copper. American Brass Co., Waterbury, Conn.	Milwaukee Corrugating Co., Milwaukee, Wis.	Gas (Oxygen). Linde Air Products Co., New York, N. Y.	Nails—Hardened Masonry. Parker-Kalon Corp., New York, N. Y.
Copper & Brass Research As- sociation. New York	Walworth Run Fdy. Co., Cleveland, Ohio	Glass—Wire. Lupton's Sons Co., David, Philadelphia, Pa.	Nails—Wire. American Steel & Wire Co., Chicago, Ill.
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Dampers—Quadrants—Accessories. Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City	American Furnace Co., St. Louis, Mo.	Handles—Boiler. Berger Bros. Co., Philadelphia, Pa.	Paint. Conners Paint Mfg. Co., Wm., Troy, N. Y.
L. J. Mueller Furnace Co., Milwaukee, Wis.	American Foundry & Furnace Co., Bloomington, Ill.	Handles—Soldering Iron. Hyro Mfg. Co., New York, N. Y.	Pecora Paint Co., Philadelphia, Pa.
Parker-Kalon Corp., New York, N. Y.	Banner Mahoning Furnace Co., Youngstown, Ohio	Hangers—Eaves Trough. Berger Co., L. D., Philadelphia, Pa.	Patterns—Furnace and Stove. Cleveland Castings Pattern Co., Cleveland, Ohio
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L. J. Mueller Furnace Co., Milwaukee, Wis.	Calkins & Pearce, Columbus, Ohio	Heaters—Gas. Calkins & Pearce, Columbus, Ohio	Vedder Pattern Works, Troy, N. Y.
Doors—Metal. Lupton's Sons Co., David, Philadelphia, Pa.	Henry Furnace & Fdy. Co., Cleveland, Ohio	Heaters—School Room. Floral City Heater Co., Monroe, Mich.	Pipe and Fittings—Furnace. Burton Co., The W. J., Detroit, Mich.
Drive Screws—Hardened Metallic Parker-Kalon Corp., 354 West 13th St., New York	Hero Furnace Co., Sycamore, Ill.	International Heater Co., Utica, N. Y.	Henry Furnace & Fdy. Co., Cleveland, Ohio
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Wheeling Corrugating Co., Wheeling, W. Va.	Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City	Waterman-Waterbury Co., Newark, Ohio	

Mention AMERICAN ARTISAN in your reply—Thank you!

CHICAGO STEEL SLITTING SHEAR



**LIGHT—POWERFUL
DURABLE**

Capacity 10 gauge sheets

Any Length or Width

Flat Bars 3/16x2"

Weight 22 pounds

Price \$12.50 Net

F. O. B. Chicago

Made of pressed steel and equipped with hold-down. Blades of highest grade crucible steel. Most indispensable high grade shears made. Equal to other shears selling at over twice the price. **ORDER YOURS TODAY.**

DREIS & KRUMP MFG. CO., 7404 Loomis St., Chicago

WIRE

electrical,
rope, barb-
ed, plain,
nails (bright

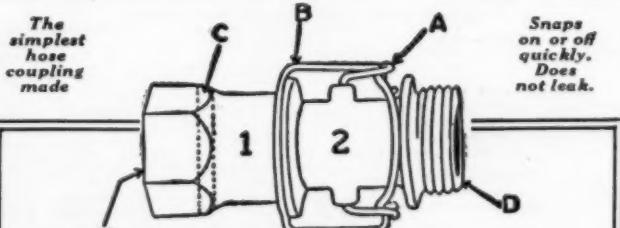
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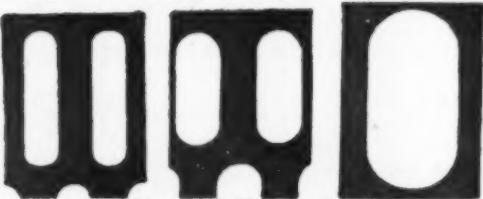
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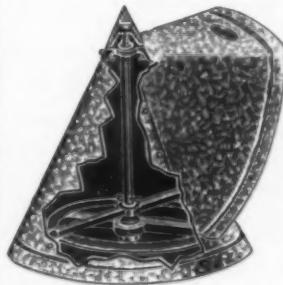
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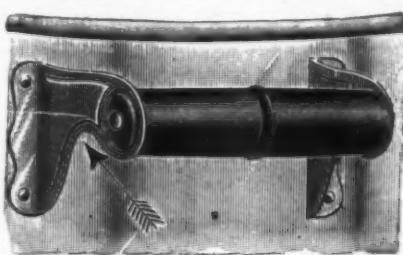
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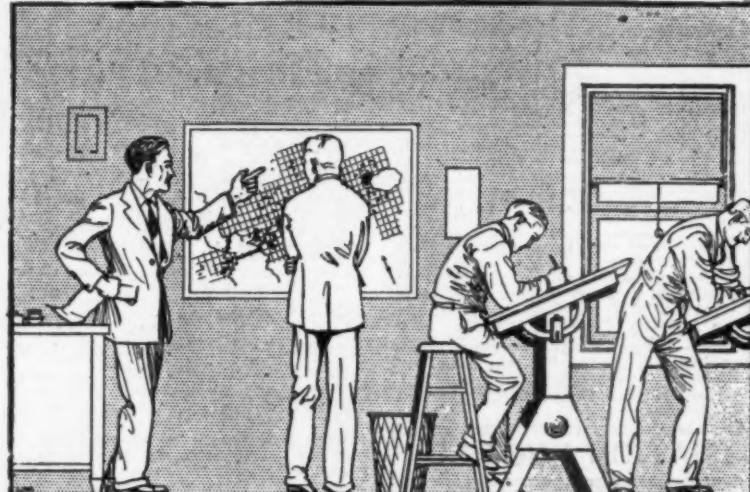
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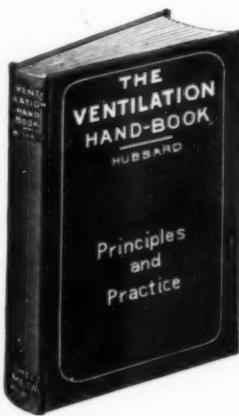
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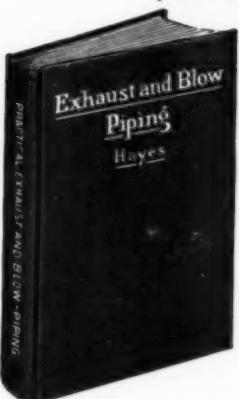
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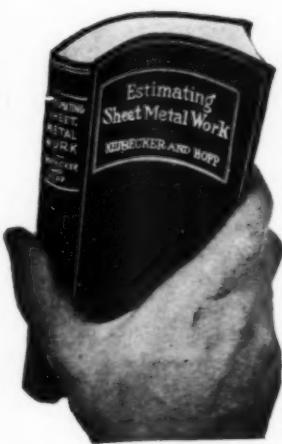
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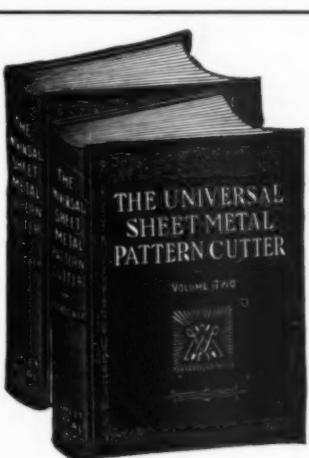
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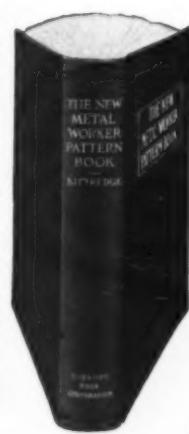
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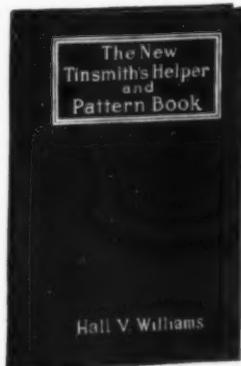
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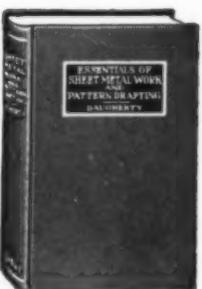


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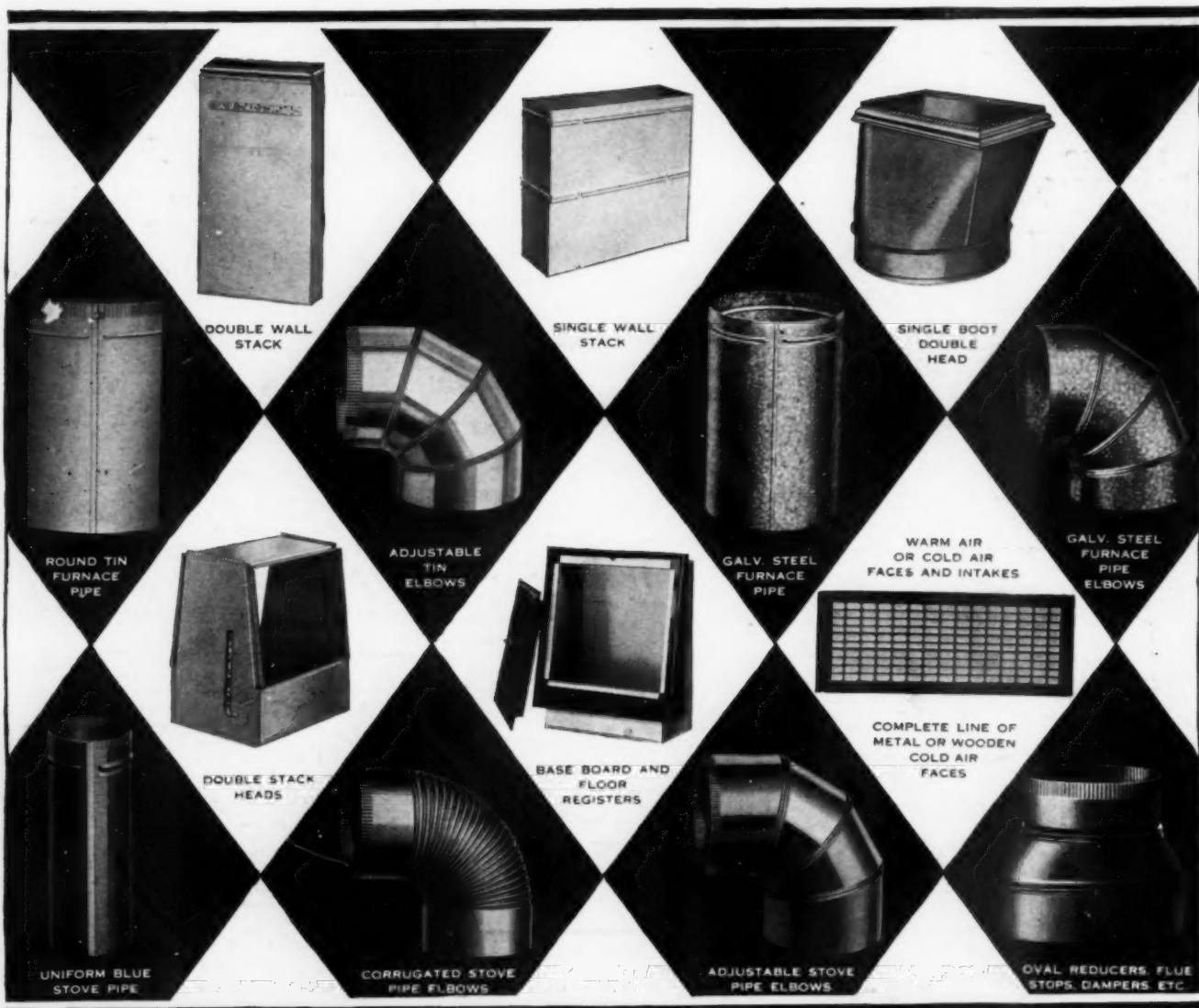
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